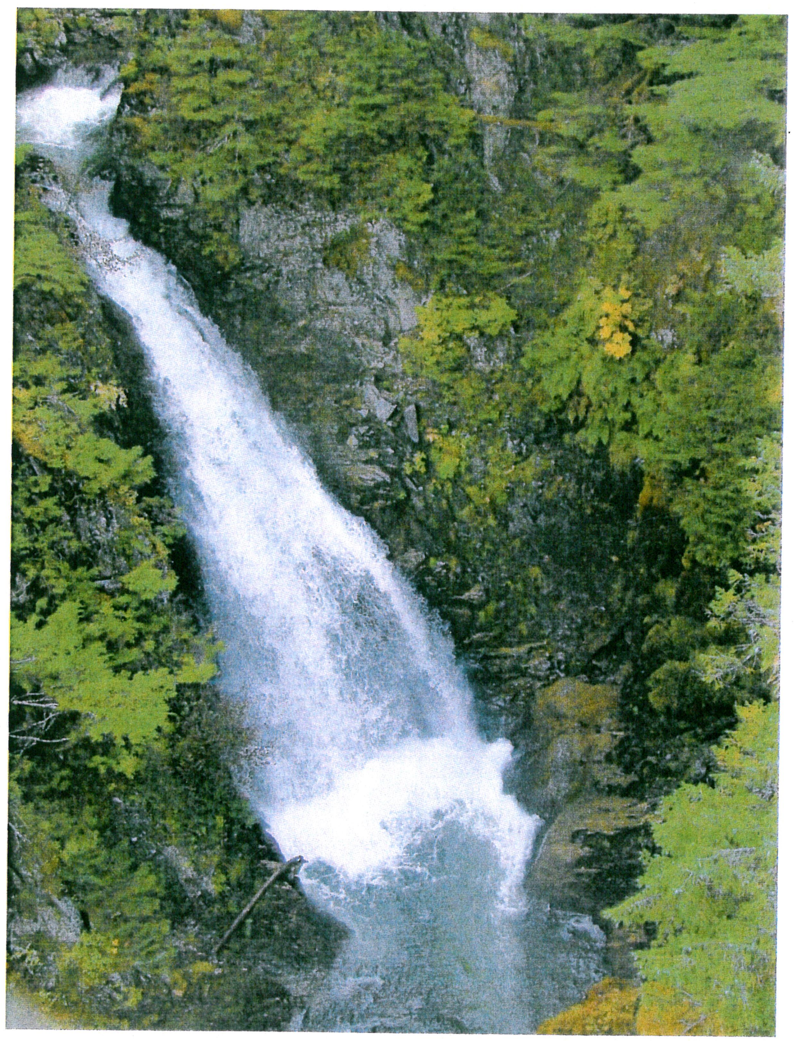
Kensington Gold Project

NPDES Permit AK-005057-1

Annual Water Quality Monitoring Summary 2005
Volume 2:
Water Quality Data



March 2006

Table of Contents

List of Tables

List of Figures

1.0 Introduction

This report includes analytical results of water quality monitoring conducted in 2005 in compliance with the requirements of the National Pollutant Discharge Elimination System for the Kensington Gold Project, near Juneau, Alaska (Permit No. AK-005057-1). A graphical presentation of data at both discharge and receiving water monitoring stations is included.

The initial permit became effective in May 1998 and expired in May 2003. Coeur Alaska continued to monitor water quality at Outfall 001 and Sherman Creek receiving water stations according to this permit through August 2005, including whole effluent toxicity testing. A new permit was issued in July 2005 and became effective on September 1, 2005. A number of changes in the new permit were adopted in September 2005. Outfall 003, the domestic wastewater discharge was not discharging until September 2005, therefore monitoring did not begin until this time.

New parameters, aluminum, iron, manganese and sulfate, are required to be monitored by the new permit at Outfall 001 and receiving water stations (Tables 1, 2). New parameters for receiving water stations are color and chlorides. Detection levels were lowered for some parameters such as mercury, to show that effluent limits were not being exceeded. Receiving water stations were added on Johnson Creek and Slate Creek in addition to new sites on Sherman Creek (Figure 1). Outfall 002 limitations are listed in the new permit, but this outfall has yet to be constructed therefore there is no discharge here.

Table 1: Receiving water parameters, dissolved metals

TDS	Aluminum	Ammonia, Total
TSS	Arsenic	Nitrate
Sulfate	Cadmium	Selenium
Turbidity	Chromium, Total	Silver
Hardness	Copper	Nickel
pH	Iron	Zinc
Flow	Lead	Chlorides
Temperature	Manganese	Color
Dissolved oxygen	Mercury	

Table 2: Effluent limitations for Outfall 001 as of September 1, 2005.

Total Recoverable Parameter		Effluent Limitations		
	Hardness	Units	Max Daily	Average Monthly
Aluminum	n/a	ug/L	143	71
Ammonia, Total	n/a	mg/L as N	4	2
Arsenic	n/a	ug/L		
Cadmium	50<H<100	ug/L	0.3	0.1
	100<H<200	ug/L	0.4	0.2
	H>200	ug/L	0.7	0.4
Copper	50<H<100	ug/L	7.3	3.6
	100<H<200	ug/L	14	7
	H>200	ug/L	26.9	13.4
Chromium, Total	n/a	ug/L		
Chromium, VI*	n/a	ug/L	16	8
Iron	n/a	ug/L	1700	800
Lead	50<H<100	ug/L	2.2	1.1
	100<H<200	ug/L	5.2	2.6
	H>200	ug/L	12.6	6.3
Manganese	n/a	ug/L		
Mercury	n/a	ug/L	0.02	0.01
Nickel	50<H<100	ug/L	47.7	23.8
	100<H<200	ug/L	85.7	42.7
	H>200	ug/L	154	76.8
Nitrate	n/a	mg/L as N	20	10
Selenium	n/a	ug/L	8.2	4.1
Silver	50<H<100	ug/L	1.2	0.6
	100<H<200	ug/L	4.1	2
	H>200	ug/L	13.4	6.6
Zinc	50<H<100	ug/L	66.6	33.2
	100<H<200	ug/L	119.8	59.7
	H>200	ug/L	215.6	107.5
TDS	n/a	mg/L	1000	1000
TDS/anions/cations	n/a	mg/L		
Sulfate	n/a	mg/L	200	200
Turbidity, effluent	n/a	NTU		
Turbidity, background	n/a	NTU	<5 above background	
Hardness	n/a	mg/L CaCO3		
pH	n/a	S.u.	range >6.5<8.5	
TSS	n/a	mg/L	30	20
Flow	n/a	gpm		
Temperature	n/a	oC		
Dissolved oxygen	n/a	mg/L		
Toxicity	n/a	TU	1.6	1.1

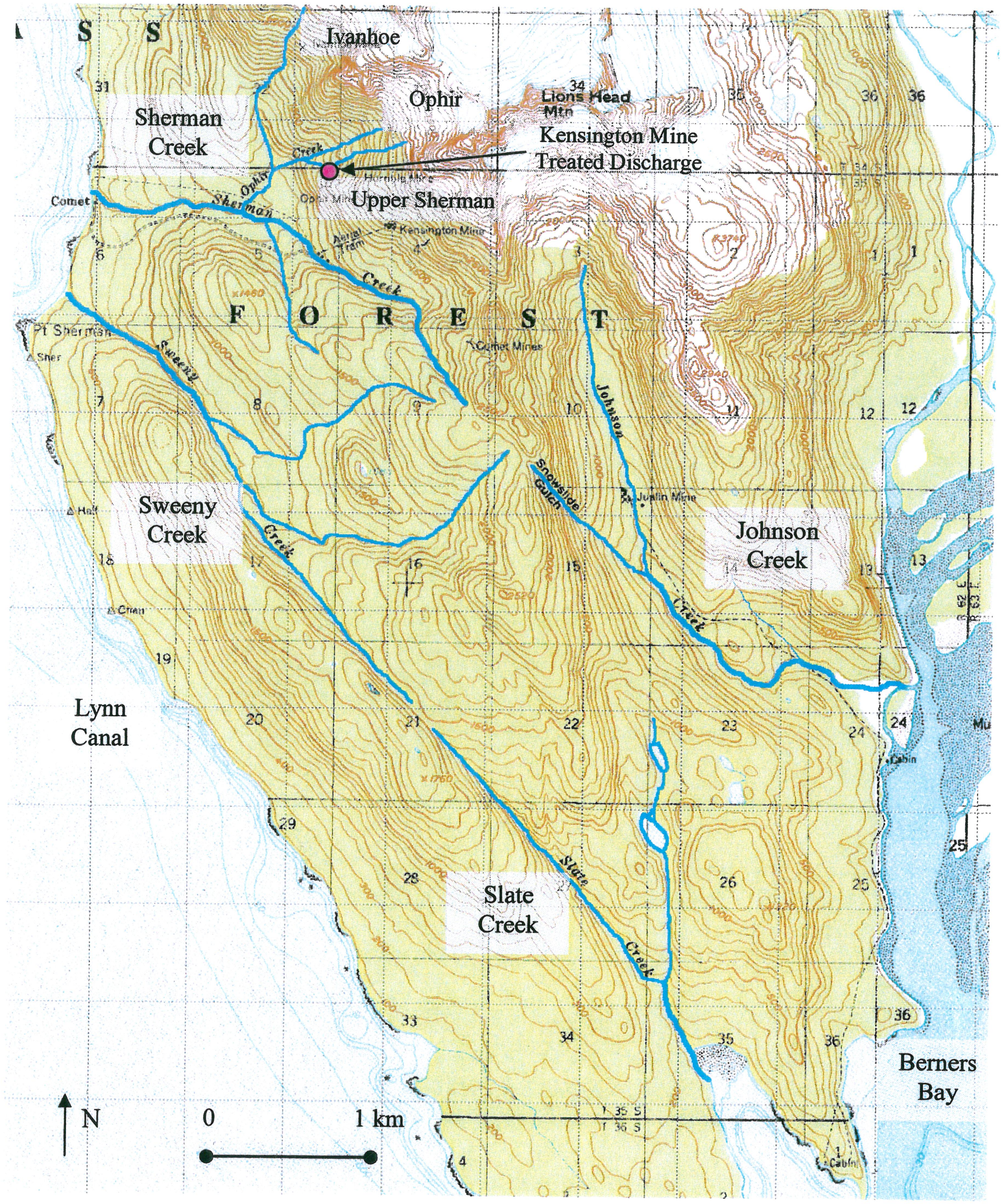


Figure 1: Location of watersheds around Kensington Gold Project 2005.

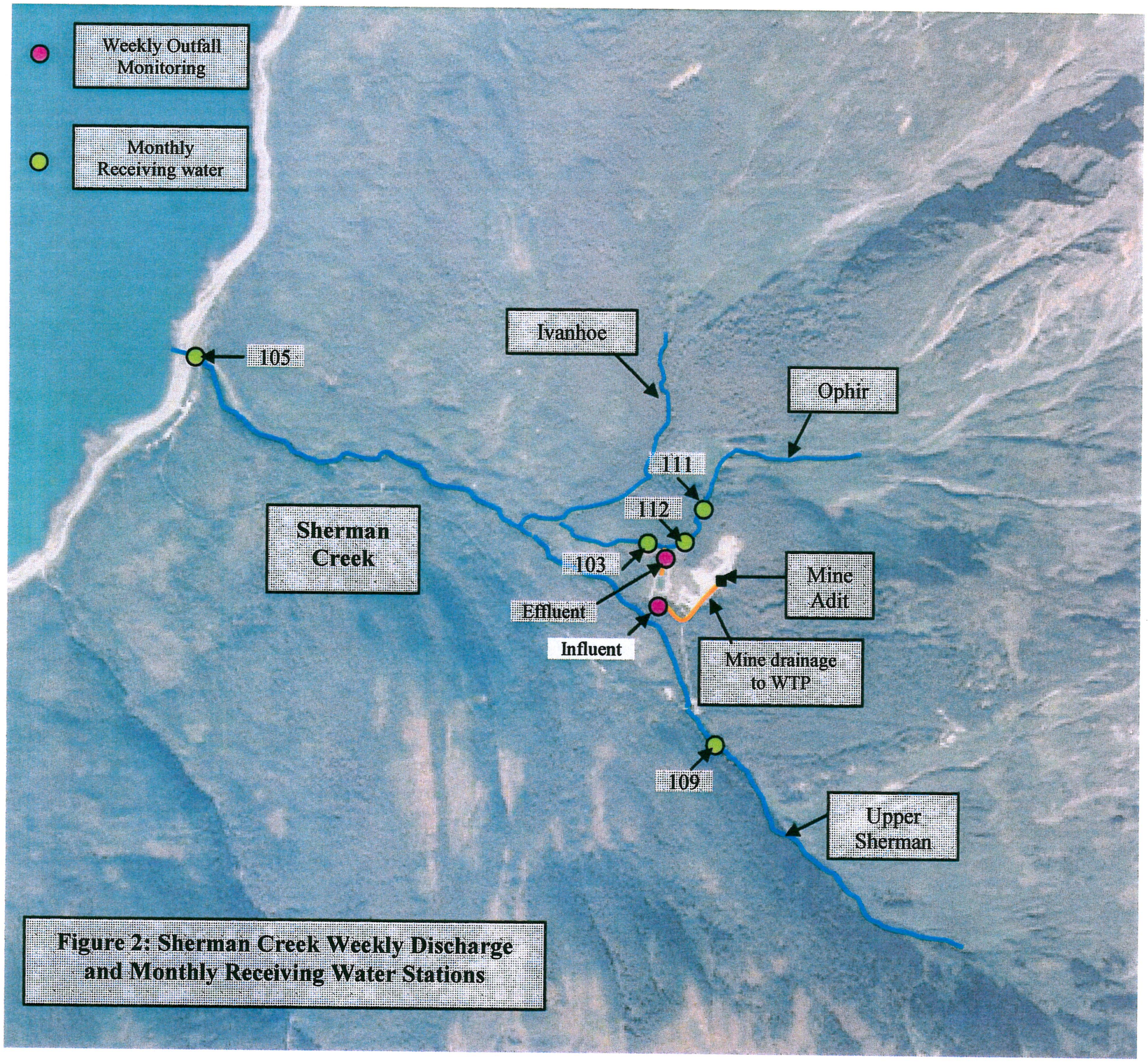


Figure 2: Sherman Creek Weekly Discharge and Monthly Receiving Water Stations

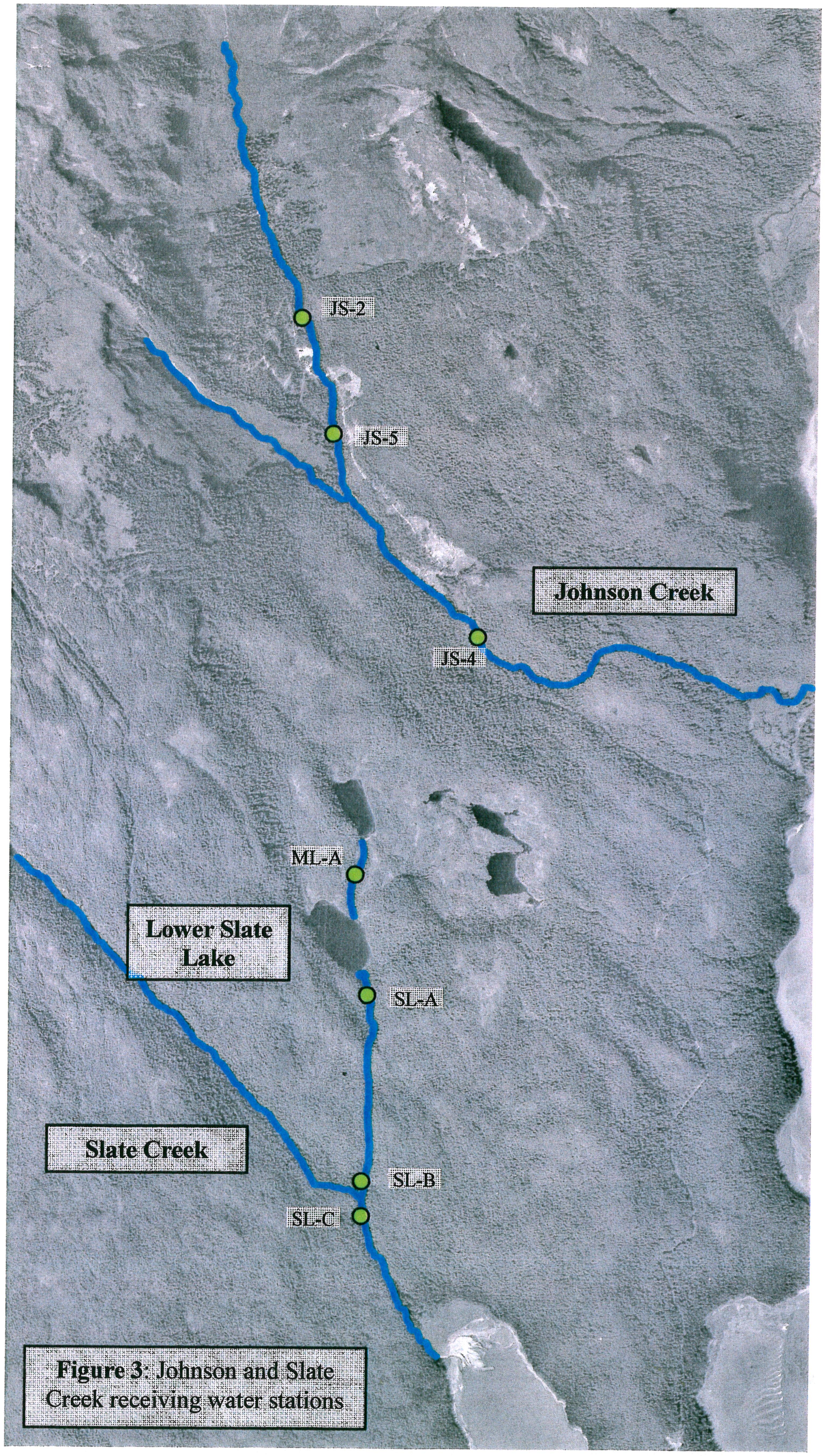


Figure 3: Johnson and Slate Creek receiving water stations

2.0 Quality Assurance/Quality Control

Coeur Alaska's Quality Assurance Project Plan (QAPP) is followed at all stages of monitoring from acquiring sample containers, through sample collection and transport of samples to the laboratory. Laboratory analysis include appropriate QA/QC procedures including testing of matrix spikes for each analyte to check the accuracy of sample results. Method blanks accompanying the samples are analyzed for the same parameters as the samples to test for contaminants. Laboratory duplicates are also tested to examine the accuracy of sample results. In the lab reports, results are shown to three significant figures to avoid rounding errors in calculations. If the sample concentration is greater than 4 times the spike level, a recovery is not meaningful and the result is used as a replicate. Level 2 reports, including QA/QC information are received from the analyzing laboratories for all sampling.

3.0 Water Quality Monitoring Conducted in compliance with permit issued September 1, 2005:

Analysis of water quality is currently conducted at Outfalls 001 (treated mine drainage) and 003 (Kensington Camp wastewater discharge) and will commence at Outfall 002 when constructed. The following list describes current sampling at these outfalls:

1) Continuous monitoring of flow and pH at Outfall 001 using digital readout meters built into the water treatment plant.

2) Daily Total Suspended Solids (TSS) 24 hour composite samples at Outfall 001 influent and effluent.

3) Weekly water sampling at Outfall 001 influent and effluent for analysis of total recoverable metals, and general parameters including total dissolved solid, total ammonia, total nitrogen, hardness, sulfate, pH, turbidity and dissolved oxygen. Both influent and effluent are also sampled monthly for arsenic. The effluent is sampled quarterly for TDS, anions and cations.

4) Monthly toxicity testing on water collected at Outfall 001 effluent.

5) Weekly monitoring of flow, pH, TSS, biochemical oxygen demand (BOD 5 day test) and fecal coliform at Outfall 003 (effluent from the Kensington wastewater treatment plant). Quarterly monitoring of Outfall 003 influent for BOD and TSS.

6) Monthly receiving water measurements and chemical analysis from stations ML-A, SL-B, SL-C in East Fork Slate Creek. Stations 103, 105, 109, 111 and 112 in Sherman Creek; stations JS-2, JS-4, JS-5 in Johnson Creek (Figures 5, 6).

7) Upon completion of the tailings dam, flows within the tailings dam seepage collection system (TSF-SCS) will be contained and pumped back to the tailings lake. Quarterly monitoring at this location is proposed to characterize the quality of seepage flows.

Table 3: Receiving Water Stations and Rational

Site Designation	Location	Rational
Johnson Creek Drainage		
JS-2	Johnson Creek above the Jualin process area and development rock storage area.	Historic reference site to evaluate upstream surface water in Johnson Creek.
JS-5	Johnson Creek approximately 600 feet below the upper Johnson Creek bridge, located below contributing area of admin and laydown areas.	To assess water quality downstream of disturbed areas.
JS-4	Johnson Creek at the lower Johnson Creek Bridge.	Historic monitoring point selected to evaluate cumulative water quality down gradient of process area, upper borrow sites and TSF road.
Slate Creek Drainage		
ML-A	Mid Lake Slate Creek at the proposed diversion inlet structure.	Existing site to evaluate upstream surface water in upper Slate Creek as required by the NPDES permit.
SL-B	Slate Creek 10 meters upstream from the confluence with the West Fork Slate Creek.	Downstream site to monitor water quality in Slate Creek above the confluence with the West Fork Slate Creek as required by the NPDES permit.
SL-C	Slate Creek 30 meters downstream of the confluence with the West Fork Slate Creek.	Downstream site to monitor cumulative water quality in Slate Creek below the confluence with the West Fork Slate Creek as required by the NPDES permit.
TSF-SCS	Tailings Dam Seepage Collection System	Evaluation of tailings dam seepage collection system water quality.
Sherman Creek Drainage		
109	Upper Sherman Creek above the Kensington Mine site.	Historic reference site to evaluate upstream surface water in Sherman Creek.
111	Upper Ophir Creek above the Kensington development rock site.	New reference site to evaluate upstream surface water in Ophir Creek.
112	Ophir Creek tributary of Sherman Creek above Outfall 001.	Provide background turbidity values to assess impact from Outfall 001.
103	Ophir Creek above the confluence with Ivanhoe Creek.	Historic monitoring site located below Outfall 001 to evaluate water quality down gradient of Outfall 001 as required by the NPDES permit. Weekly hardness samples.
105	Sherman Creek above Comet Beach.	Historic monitoring point to evaluate cumulative water quality down gradient of Kensington site required by the NPDES permit.

4.0 Description of Receiving Water Sites:

Sherman Creek

111 – Site 111 is located on Upper Ophir Creek, a tributary of Sherman Creek, upstream of the proposed Kensington development rock site. The creek here has a steep gradient with large cobble substrate into which the flow often disappears during periods of low rainfall. Water samples can be obtained further upstream prior to flow going subsurface.

112 – Site 112 is located on Ophir Creek, just upstream of the discharge point from Outfall 001. At Site 112, the stream is a moderate gradient primarily containing riffles and small pools with substrate comprised of cobble and small boulders. There are little compacted fines noticeable. The stream is shallow and approximately 6 meters wide with split channels and gravel bars, although the width alters with water level. It is located on the southern edge of a mature second growth wooded area.

103 – Site 103 is located on Ophir Creek tributary downstream of the discharge from Outfall 001, below a small, relatively calm pool. Site 103 has considerably higher flow and occasional larger substrate size than Site 112 but is otherwise comparable to Site 112. The width of the creek at Site 103 is approximately three meters wide. It is located within a wooded area.

105 – Site 105 is located on Lower Sherman Creek above the influence of high tide. The stream is fast moving with a mixture of turbulent and smooth water. The substrate consists of cobble and small and large boulders. There are little, if any, compacted fines. The width of Sherman Creek at this point is approximately six meters. The stream channel is deeply incised with alder and shrubs dominating the banks.

109 – Site 109 is located on Upper Sherman Creek, upstream of the existing road. It is located in a heavily wooded area. Sherman Creek at this point is fast moving, steep, and turbulent, consisting of a series of cascades and step pools. The channel is approximately five to six meters wide. The substrate consists of cobble, small and large boulders with little compacted fines.

Slate Creek

ML-A – ML-A is located on East Fork Slate Creek between Upper and Lower Slate lakes. The channel here is narrow (3 meters wide) with exposed bedrock. Gradient is fairly steep with cascades tumbling over frequent bedrock steps. The channel is moderately incised with steep banks. Hemlock and some cedar are present.

SL-A – SL-A is not a permitted water quality station at this time, but water samples are collected for baseline monitoring prior to construction of the Tailings Storage Facility; stream flow is also measured here using a continuous flow data logger. The site is located on East Fork Slate Creek approximately 300 meters downstream from Lower Slate Lake. The gradient is low and channel approximately 6-7 meters wide. The channel enters a steep canyon 200m downstream.

SL-B - Located on East Fork Slate Creek 10m upstream from the confluence with West Fork Slate Creek and just downstream of the plunge pool below the falls barrier. The stream here runs through a deeply incised bedrock canyon with deep bedrock pools. Stream width is 3-5 meters depending on flow. A gravel bar is present on the east bank.

SL-C – Located 30m downstream from the confluence with West Fork Slate Creek within an incised bedrock canyon. Deep bedrock pools are separated by cascades. Stream width is 5-6 meters. There are several fallen trees in the canyon bottom resulting from slides on the steep banks.

Johnson Creek

JS-2 – This site is located on Johnson Creek upstream of the Jualin mill site. The gradient is low and the stream splits into braids with large pools due to old beaver dams at the north end of the mil site. The site is located in the main channel upstream of these braids. The channel runs through a narrow-bottomed steep valley with numerous slide zones.

JS-5 – This site is located 600 ft downstream of the upper bridge that crosses Johnson Creek. The gradient is moderate and substrate contains large boulders. The stream is approximately 10 m wide and passes through second growth spruce and hemlock forest.

JS-4 – This site is located 100ft downstream of the lower Johnson Creek bridge. The stream here is around 14 meters across and the substrate consists of mostly cobbles. The valley here is less steep with some muskeg nearby, though the stream banks at the site are covered in spruce and hemlock.

5.0 Water Quality Monitoring Results

5.1 Description of Tables Figures for 001 Outfall:

Analytical results for the 001 Outfall are included in Appendices 1a through 1i. Figures 4 to 25 are graphical presentations of analytical results for the influent and effluent for Outfall 001 discharge. Each graph shows results of a single parameter for both influent and effluent. Aluminum, iron, manganese and sulfate do not appear until September as they were only required by the new permit that became effective at this time. Seven parameters (arsenic, chromium, nickel, selenium, silver, zinc and mercury) were monitored throughout the year, but were not detected until September when a lower detection level was used to meet requirements of the new permit. The maximum daily limit is shown on each graph. For the metals, cadmium, copper, lead, nickel, silver and zinc, the maximum daily limit varies with hardness. The method reporting level for each parameter is shown on each graph. Parameters that were not detected at the method reporting level for a particular site do not appear on the graphs, but are included in Appendices 1h and 1i.

Figures 4 to 12 show weekly analytical results for total recoverable metals, TSS, TDS, sulfate, nitrate and ammonia, turbidity, flow and pH for 001 effluent, while Figures 13 to 20 show average and maximum values for each parameter for each month for influent and effluent. Figures 21 to 25 show monthly average and maximum values for those parameters that are monitored at the effluent only, namely nitrate, ammonia, sulfate, TDS, temperature, hardness (collected downstream at receiving water site 103) and dissolved oxygen.

5.2 Water Quality Trends for 2005 Influent and Effluent

Total recoverable aluminum at the 001 influent was almost 5000 ug/L in September and over 5000 ug/L in December (Figure 17). The effluent exceeded the maximum daily limit on 8 occasions during September to November (Figure 4). Effluent aluminum in December was below the maximum daily limit. Arsenic was not detected in effluent samples except for low levels in October and November. Cadmium was not detected in any samples throughout the year. Total chromium was only detected at the influent and effluent in September through December when detection levels were lowered (Figures 5 and 14). Levels of copper appeared to increase in the influent throughout the year (Figure 14) but very low levels were detected in the effluent (Figure 5). Total iron was high (almost 12,000 ug/L) in influent samples in December (Figure 18), but did not exceed limits at the effluent (Figure 5).

Lead was not detected in samples prior to June when an exceedence occurred due to uncertain reasons (no lead was detected at the influent). Low levels of lead were detected in the effluent in September and November (Figure 6). Manganese was a new parameter monitored from September. It ranged from around 10 to 25 ug/L. Nickel was not detected until September due to lower detection levels; levels ranged from between 3 to 5 ug/L through December. Both influent and effluent values are well below daily and average limits, which vary with hardness (Figure 16). Selenium was only detected from September again due to a change in detection level. Influent selenium was very low (less than 2 ug/L), and effluent levels were slightly lower (Figure 7). Silver was only detected at very low levels in October and December. Zinc was also present at very low levels at both locations. The detection level for total mercury was lowered in September to show that effluent levels were not exceeding the 0.01 ug/L average monthly limit. Influent mercury reached 0.6 ug/L in June, but typically values are less than 0.05 ug/L and effluent mercury is typically less than 0.0015 ug/L (Figure 8). Sulfate levels are only monitored at the effluent and typically range from 100 to 150 mg/L.

Total suspended solids have a wide range in influent samples from less than 20 to over 300 mg/L and even reaching over 600 mg/L in December and over 1100 mg/L in April (figure 13), but effluent values are almost always less than 4 mg/L (non-detect level). Total dissolved solids in the effluent ranged from around 200 to 300 mg/L throughout the year, well below the limit of 1000 mg/L. Nitrate was present in the effluent at around 0.2ug/L in January, March, June and August, then none was detected until December (Figure 9). Ammonia showed a slightly different trend, being present also in May, October, November and highest in December. Effluent turbidity was typically less than 2 NTUs occasionally more than 3 NTUs and never exceeded 5 NTUs of the background turbidity. The daily limit on Figure 10 for turbidity is 5 NTUs above the background turbidity measured upstream of the discharge in Sherman Creek.

Flow increased at the effluent from early 2005 from around 100 gallons per minute to 250 gpm in the Summer to 300 to 400 gpm in the latter part of the year (Figure 11). Continuous pH readings are shown in Figure 12 showing the range at the effluent to be around 7.5 to 8.2. Temperature at the effluent ranged from around 3°C in January to 14°C in August, in accordance with expected seasonal variation. Hardness is measured downstream from the discharge and was typically higher in winter months (150 to 200 mg/L) and lower in summer (less than 100). Dissolved metals were monitored at influent and effluent until issuance of the new permit when only total recoverable metals were analyzed as required by the permit. Dissolved silver, copper (Figure 19) chromium and lead were the only dissolved metals detected at various times in early 2005.

5.3 Description of Tables and Figures for Receiving Water Stations

Appendix 2b summarizes all receiving water data by individual parameter while Appendix 2c summarizes the data by site. Figures 26 to 61 are graphical presentations of the analytical results for receiving water stations. Figures 26 to 51 show dissolved parameters and 52 to 61 show total recoverable parameters. Each figure shows results for a single parameter, with a separate graph for each stream. For Sherman Creek, receiving water stations 103, 105 and 109 were the only stations monitored from January to August. Station 112 was added in September and Station 111 was added in December. On Johnson Creek, site JS-1, located next to the old Jualin camp, was monitored from February through June; sites JS-2, JS-4 and JS-5 were monitored from July through December. On Slate Creek, SLB and SLC were not monitored in January and February, while SLA was not monitored from September through November. SLA is not a permitted receiving water station; however monitoring has been conducted to collect baseline data for Outfall 002. The method reporting level (MRL) shown on each graph is the level currently used; actual MRLs varied over 2005 and are given in Appendix 2d. Sites are listed on each graph from upstream to downstream for comparison.

5.4 Water Quality Trends for 2005 Receiving Water Stations

Ammonia was only detected in Sherman Creek at site 105 (near creek mouth) in January, site 109 (Upper Sherman) in February and site 103 (downstream from discharge) in February, April, July and August. The highest value detected was 0.1 mg/L at 109. Less than 0.08 mg/L was present at all other sites (Figure 26). Nitrate and nitrite as nitrogen was detected at low level at all sites on Sherman that were monitored February, March, May and December. No nitrate was detected at 109 in April and none was detected at any site on Sherman in January and July through November. Low levels of nitrate were detected at sites on Johnson and Slate Creek in winter months only. Nitrite was not detected at any time. Sulfate appeared at highest concentration on Sherman Creek upstream of the 001 discharge (Site 112). Low sulfate levels were detected on Johnson and Slate Creeks (Figure 29).

Chloride concentrations (Figure 30) were highest in Sherman Creek, downstream of the 001 discharge (3-5mg/L), but the highest concentration (over 8 mg/L) was observed in December at MLA on Slate Creek (upstream of Lower Slate Lake). Total dissolved solids were highest at site 103 on Sherman Creek from January through April, but site 112, upstream of the discharge was the highest in November and December. Site 109 in Upper Sherman was highest in July. Johnson Creek showed highest TDS at JS-1 in February and JS-4 in November and December. Slate Creek TDS was highest at MLA (upstream site) for most of the year with some seasonal increase in summer. Total suspended solids were not detected in Sherman Creek at any site. TSS was detected at downstream sites in August, September and November and only at the upstream site (JS-2) in December. TSS was only detected in Slate Creek at SLC in September 2005.

Total hardness was highest on Sherman Creek out of all the streams (Figure 34). Site 103 was higher in winter months than summer. Site 109 was high (over 200mg/L) in February and site 112 increased from September to December from less than 50 to over 150mg/L. Johnson Creek hardness was less than 50mg/L throughout the year at all sites and increased slightly from upstream to downstream. There was also a slight decrease in summer months. Slate Creek, however, appeared to have higher hardness in summer, with highest values at MLA upstream. The 3 sites downstream had very similar values. SLA was not monitored from September through November.

Water temperature varied in accordance with expected seasonal changes, increasing in summer and decreasing in winter in each stream (Figure 36). Slate Creek was the warmest most likely due to the presence of lakes in the system that warm in summer. Turbidity was less than 1 NTU at all sites except JS4 and JS5 in August through December (Figure 38) when turbidity ranged from 2 to over 9 NTUs. Turbidity was higher (up to 3 NTUs) at upstream sites in November due to heavy rains. Color has a distinct seasonal trend, becoming higher in Fall as plants die off. Slate Creek, particularly MLA showed the highest color values (Figure 41). Conductivity was highest in Sherman Creek compared to the other two streams (Figure 41). Site 103 showed high conductivity in January and February then lower values in summer.

Dissolved aluminum concentrations began to be monitored in Sherman Creek in September (Figure 43). Downstream sites (103, 105) had higher concentrations in September than upstream sites, but in October and November, sites upstream of the 001 discharge had a higher concentration than those downstream. Little dissolved Al was detected in December. Dissolved Al exceeded 160 ug/L at 109 in October. In Johnson Creek, dissolved Al increased in September and October at downstream sites. The highest dissolved Al was less than 60ug/L. At Slate Creek, dissolved Al was lower in summer and highest in Fall. MLA showed the highest concentrations at over 100 ug/L. Total recoverable aluminum was consistently high in Slate Creek (Figure 53). No data is available for September to November. Total Al appeared to be higher in winter (highest in March at MLA at 140ug/L and lower in summer.

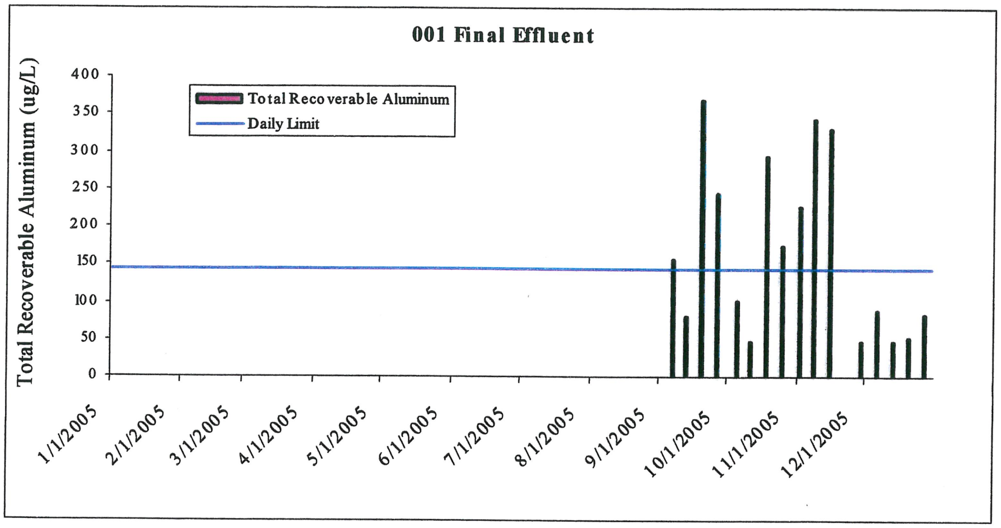
Dissolved arsenic in Sherman Creek was highest at site 109 in Upper Sherman (less than 1.5 ug/L), with little detected at 103 or 112. No total recoverable arsenic was detected in Sherman Creek at any time. In Johnson Creek, arsenic levels were less than 1ug/L throughout the year. Slate Creek showed the highest arsenic concentration (almost 3ug/L) at MLA in December (Figure 44). Total recoverable arsenic was highest in Slate Creek at SLA in April (almost 7ug/L). Dissolved chromium was detected at around 4ug/L at all Sherman Creek and Johnson sites in September with almost none detected at any other time (Figure 45). Slate Creek also showed more chromium in September than any other time although low levels were detected at other times. Total recoverable chromium was less than 0.5ug/L in March-April and July-August with none detected at other times. Dissolved or total cadmium was not detected at any time.

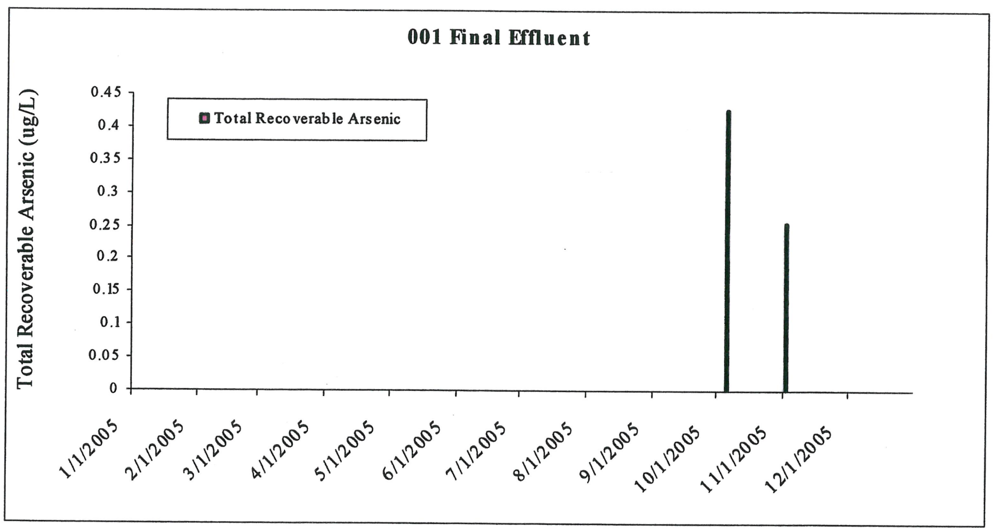
The highest dissolved copper concentrations were observed in Slate Creek (SLA, MLA) in April. Total recoverable copper was also high (7-8ug/L) at this time. All other copper values were less than 2 ug/L (Figure 46). Dissolved iron was only detected in Sherman Creek at one site (109) on one occasion (November) in 2005 (Figure 47). Total recoverable iron was high at 103 in December (over 300ug/L). High dissolved iron (over 700ug/L) was observed in Johnson Creek in March. Slate Creek had iron levels from 100 to 200 ug/L from January to April and from September to December, with none detected from May through July. Total recoverable iron ranged from 50 to 150ug/L from June through August and was over 150ug/L from January-March and in December.

Very little dissolved manganese was detected in Sherman Creek (monitoring began in September). Manganese in Johnson Creek increased at downstream sites in September, October, and November (50ug/L). Slate Creek showed high manganese at SLA in April (75ug/L) and moderately high manganese at MLA in November. MLA was higher than other sites throughout the year (Figure 48). Dissolved mercury began to be monitored at low level detection in September. The site just downstream from 001 discharge showed no detection while other sites showed low levels in November and December. Low levels of dissolved mercury were detected more frequently in Slate Creek with values decreasing in summer.

Dissolved nickel appeared to increase at site 103 on Sherman Creek from September to December (Figure 50). The value at 105 downstream remained below 1ug/L. Nickel was higher at 112 upstream than 103 in October and November. Johnson Creek nickel was less than 1ug/L throughout the year; Slate Creek nickel appeared elevated in April (3.5 to 4 ug/L at SLA and SLC. Nickel was also slightly higher from September to December than earlier in the year. Dissolved selenium was not detected in Sherman or Johnson Creeks until September when levels were only around 1ug/L (Figure 51). Selenium was less than 1ug/L on Slate Creek. Dissolved zinc was less than 2ug/L on Sherman Creek at all sites and only exceeded 2ug/L on Johnson Creek in April and October. Higher zinc values were observed on Slate Creek reaching 16ug/L at SLC in April, 12ug/L at SLC in July and 10ug/L at MLA in October (Figure 52).

Figure 4: Total Recoverable Metals in 001 Final Effluent, 2005





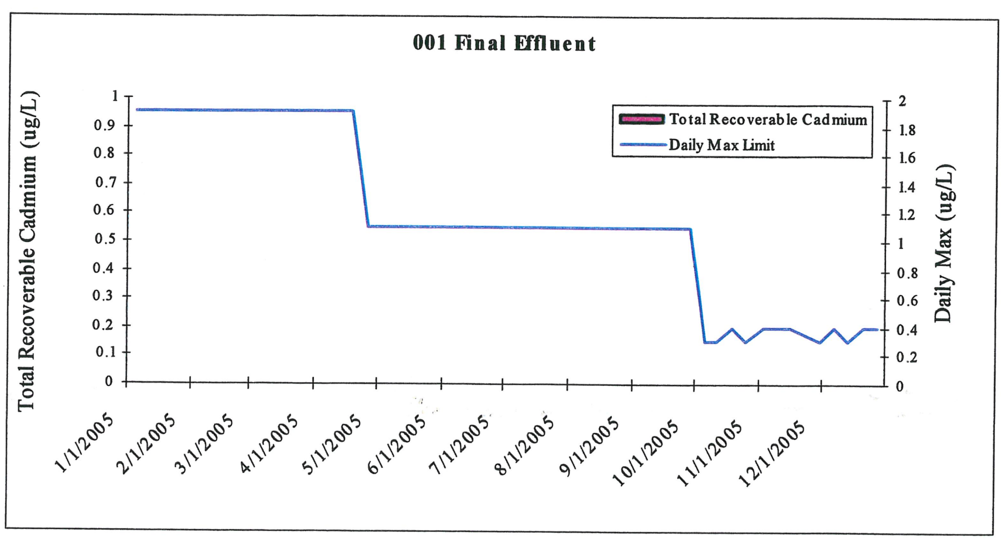
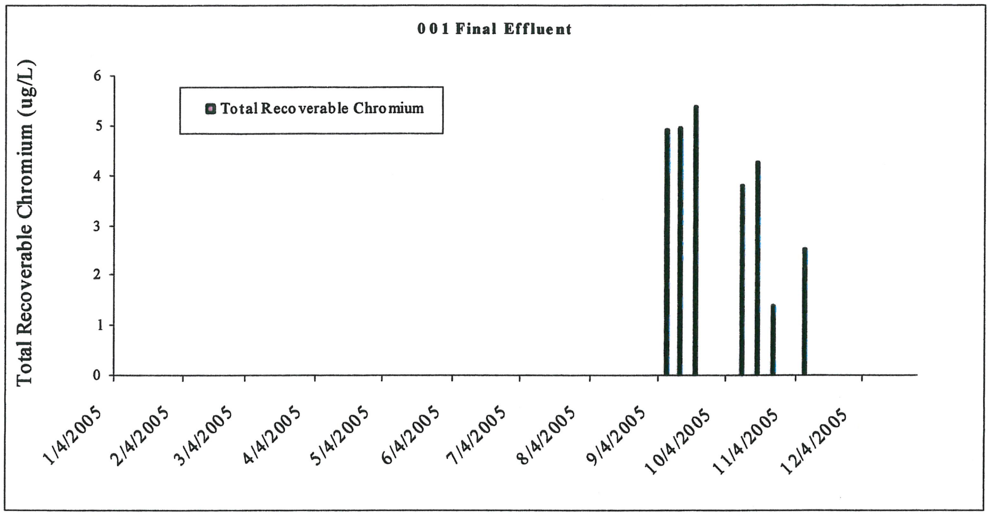
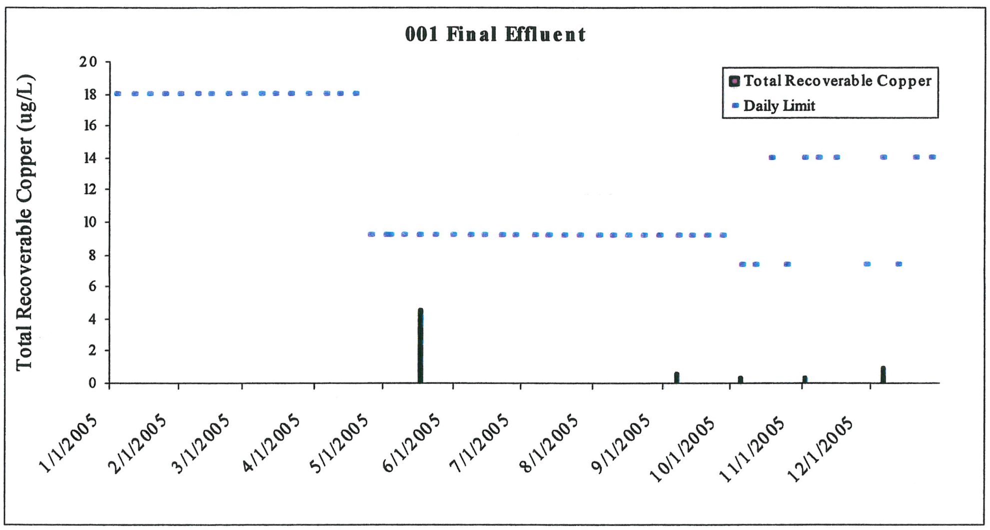


Figure 5: Total Recoverable Metals in 001 Final Effluent, 2005





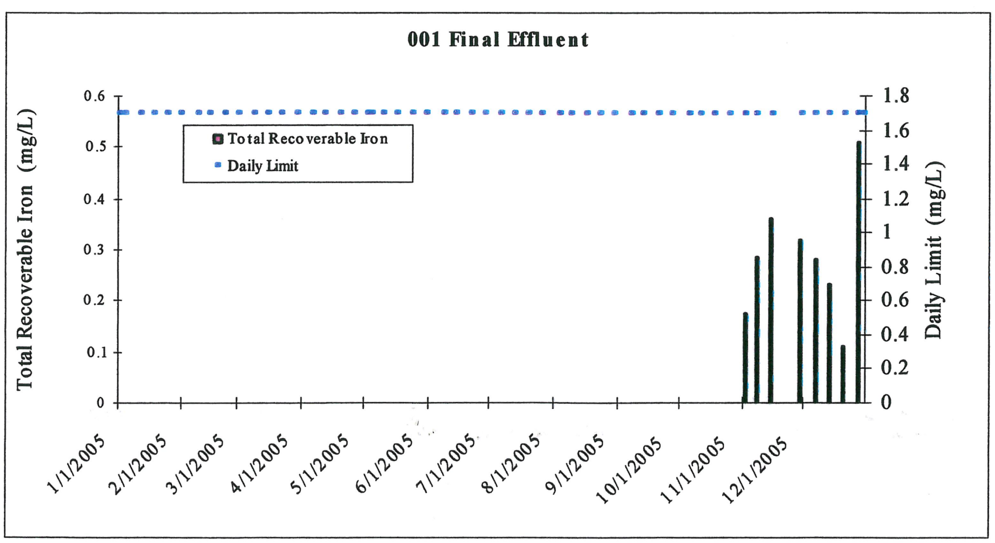
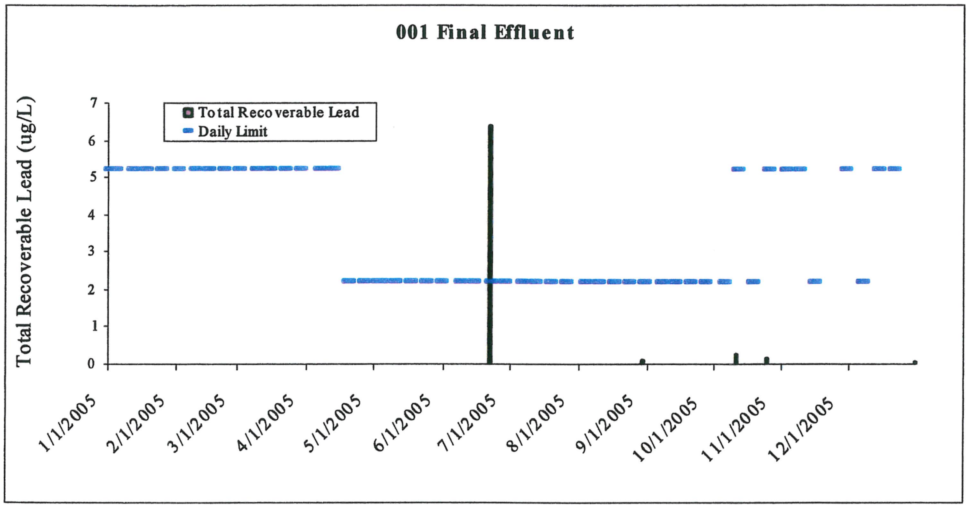
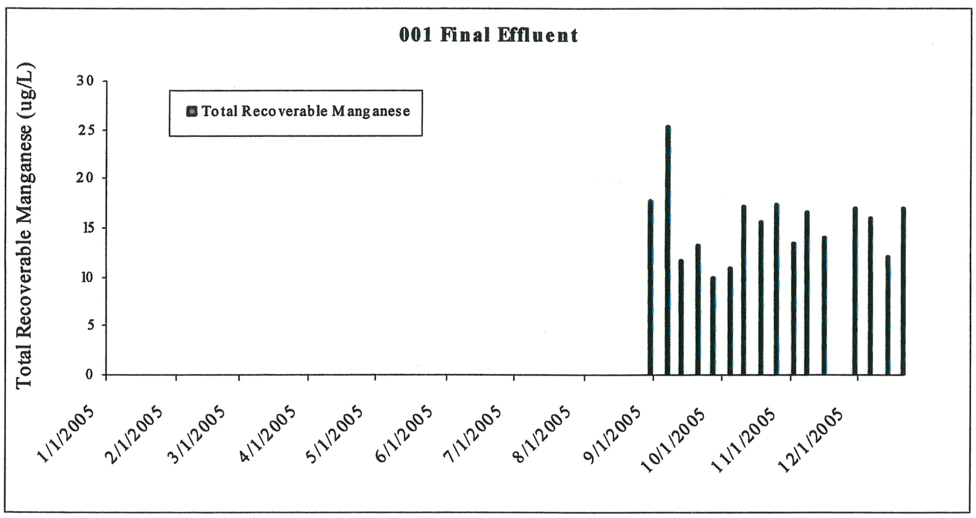


Figure 6: Total Recoverable Metals in 001 Final Effluent, 2005





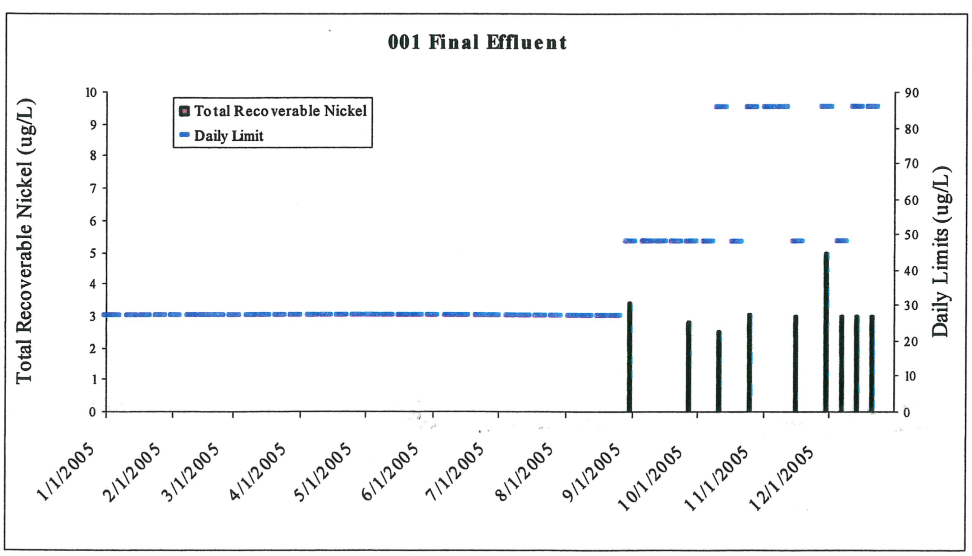
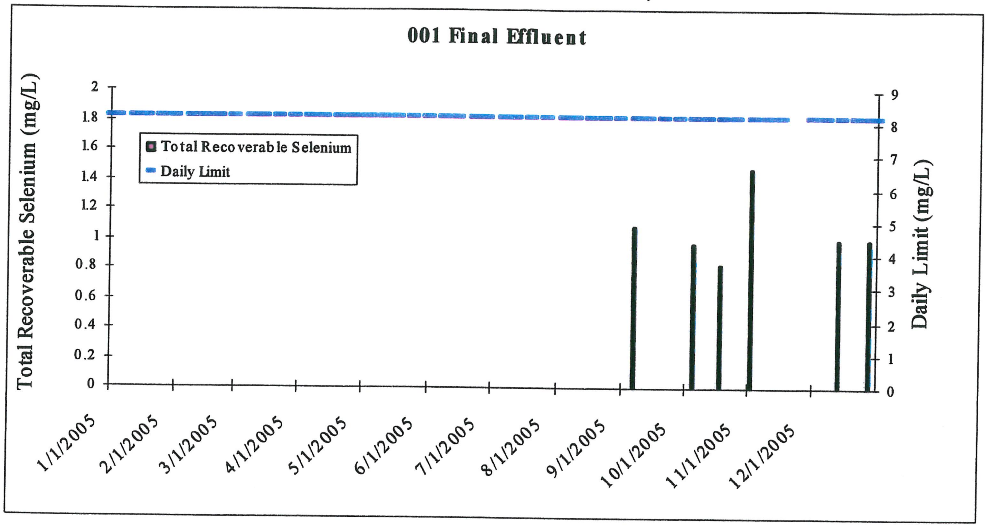
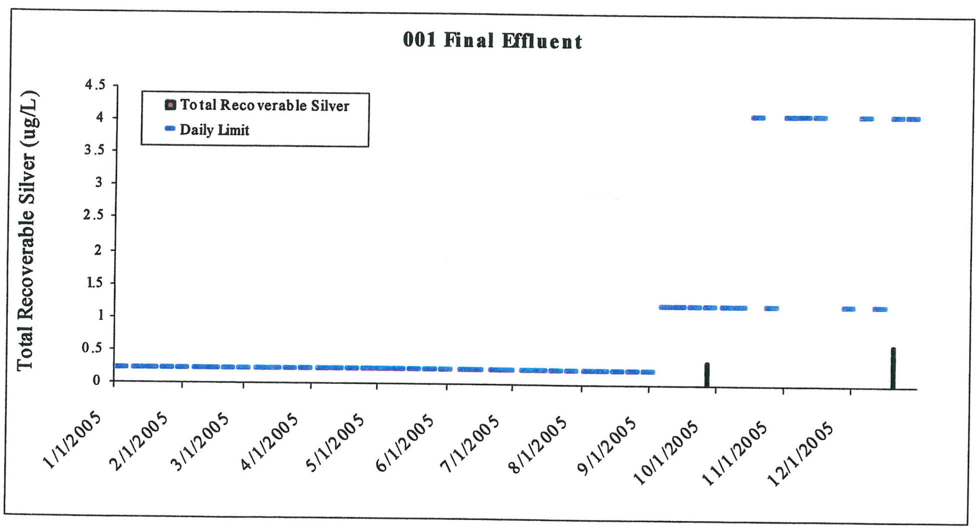


Figure 7: Total Recoverable Metals in 001 Final Effluent, 2005





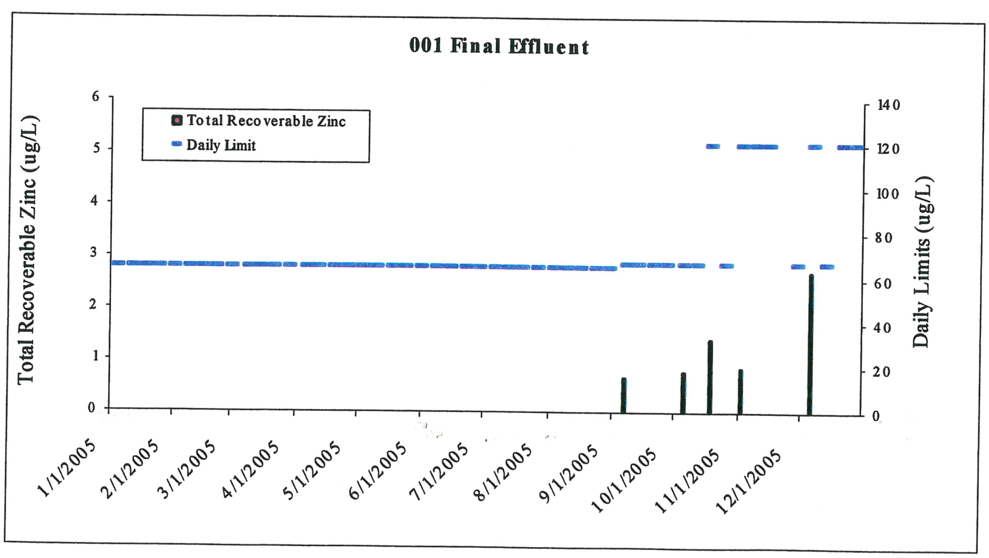
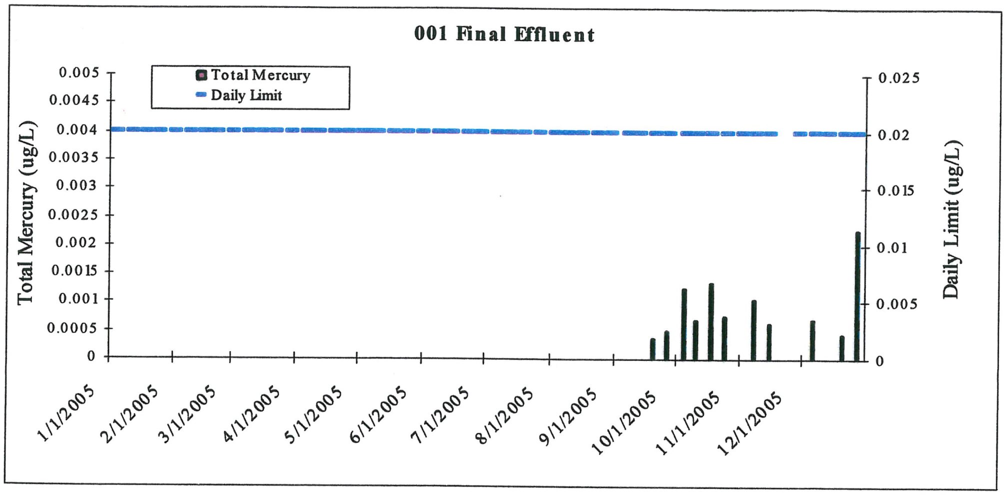
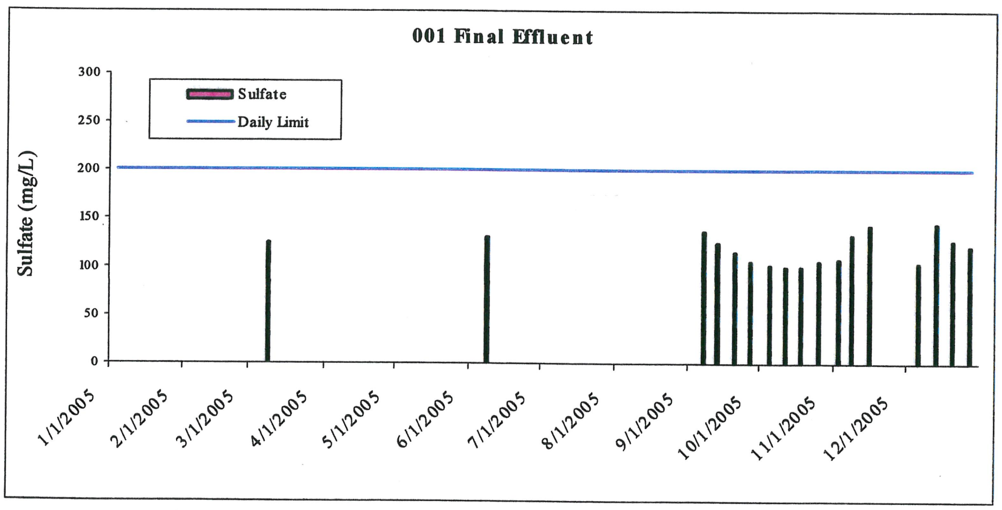


Figure 8: Total Mercury, Sulfate and TSS in 001 Final Effluent, 2005





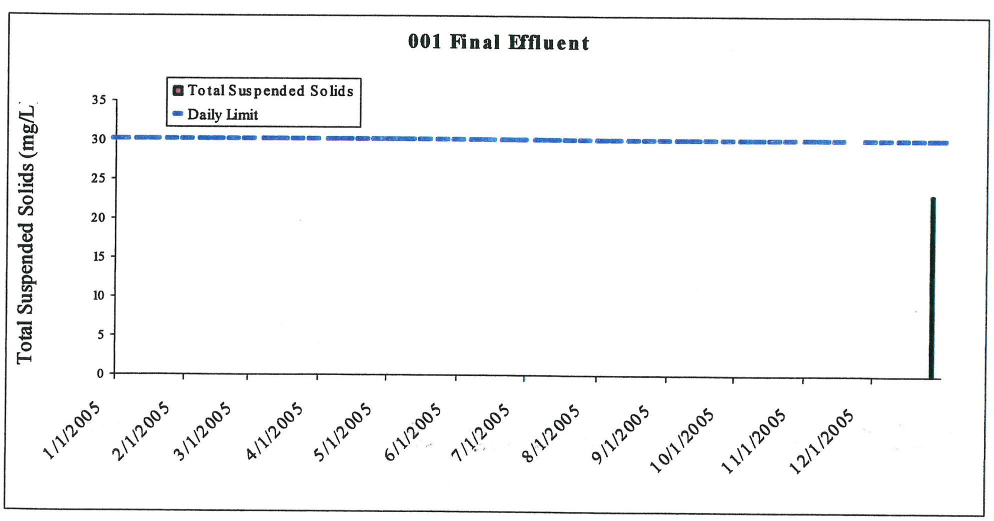
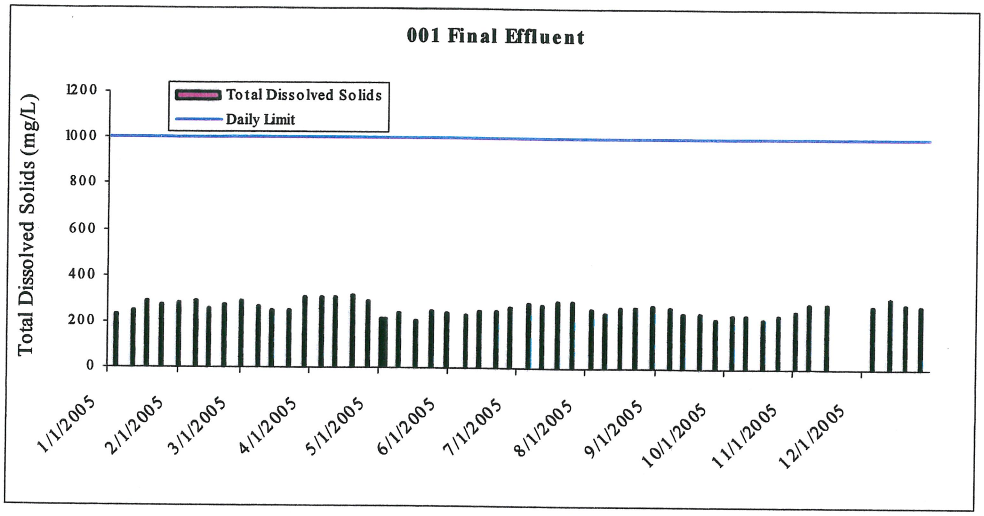
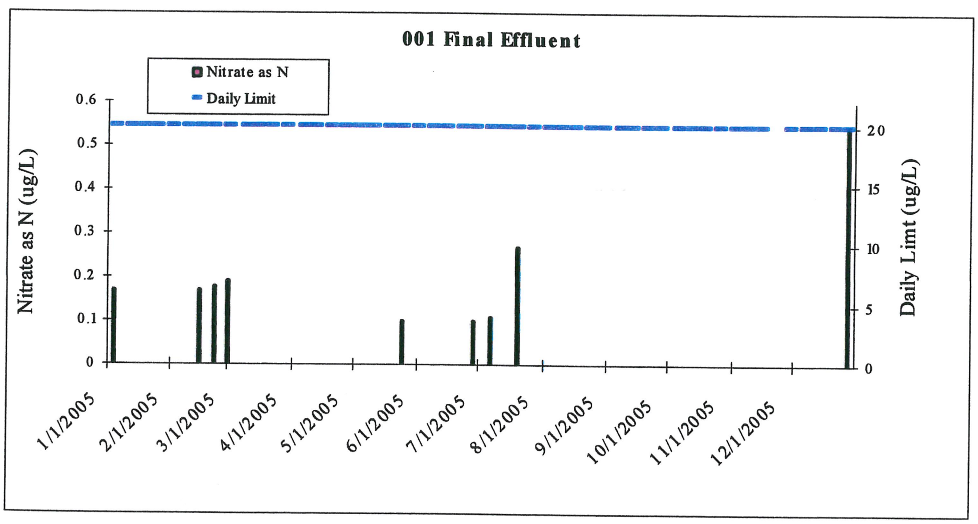


Figure 9: TDS, Nitrate and Ammonia in 001 Final Effluent, 2005





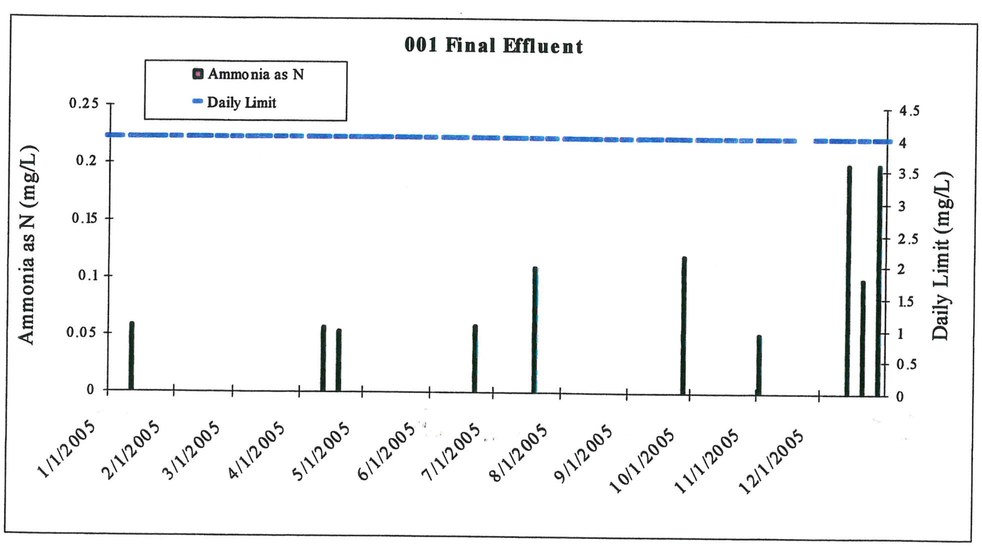


Figure 10: Turbidity in 001 Final Effluent, 2005

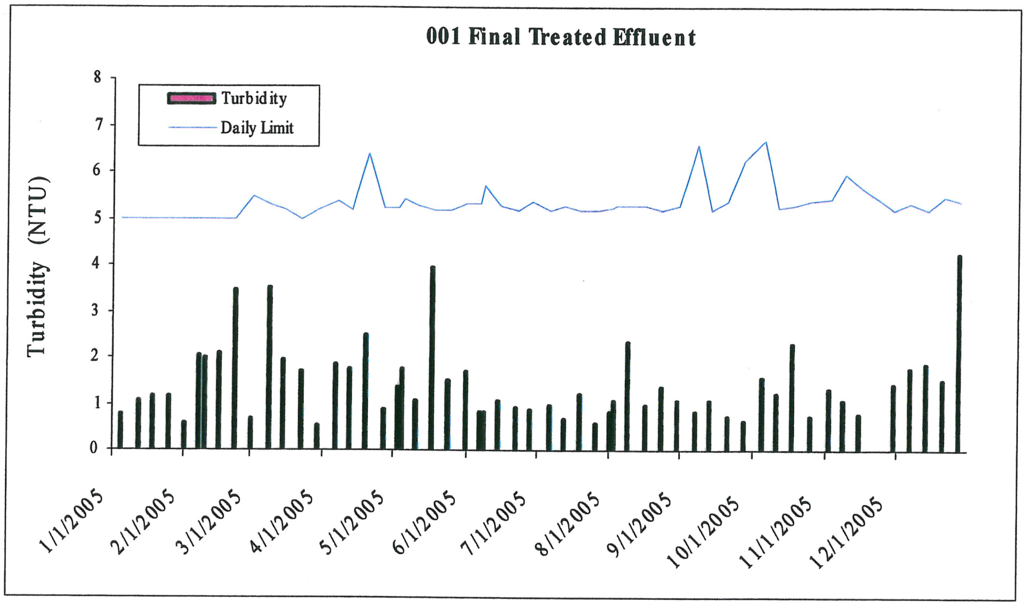


Figure 11: Discharge Flow for 001 Final Effluent, 2005

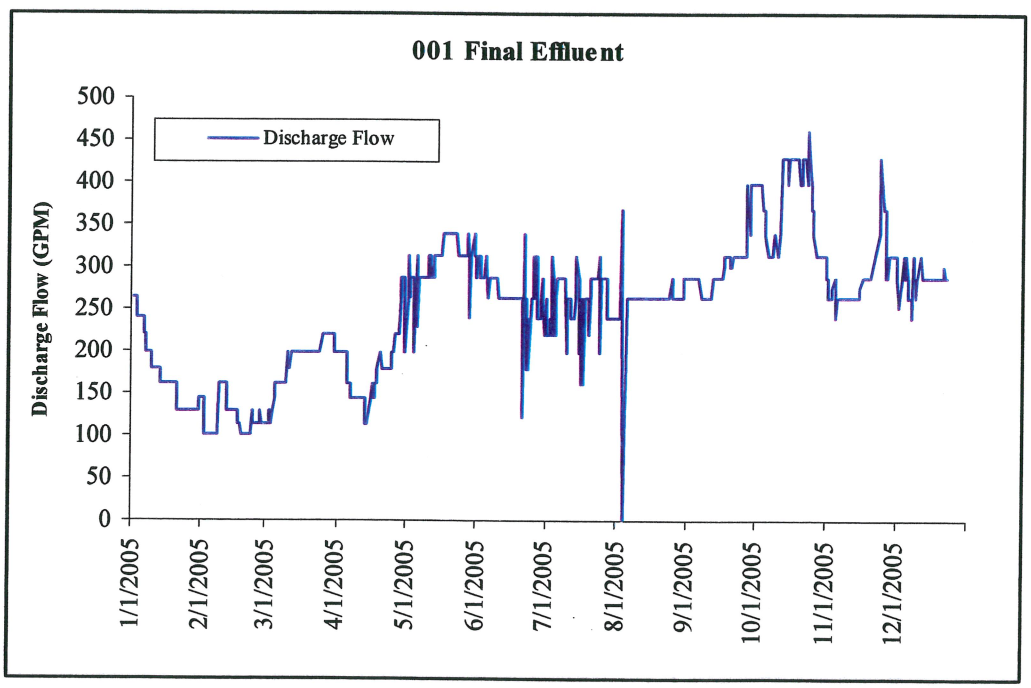


Figure 12: pH for 001 Final Effluent, 2005

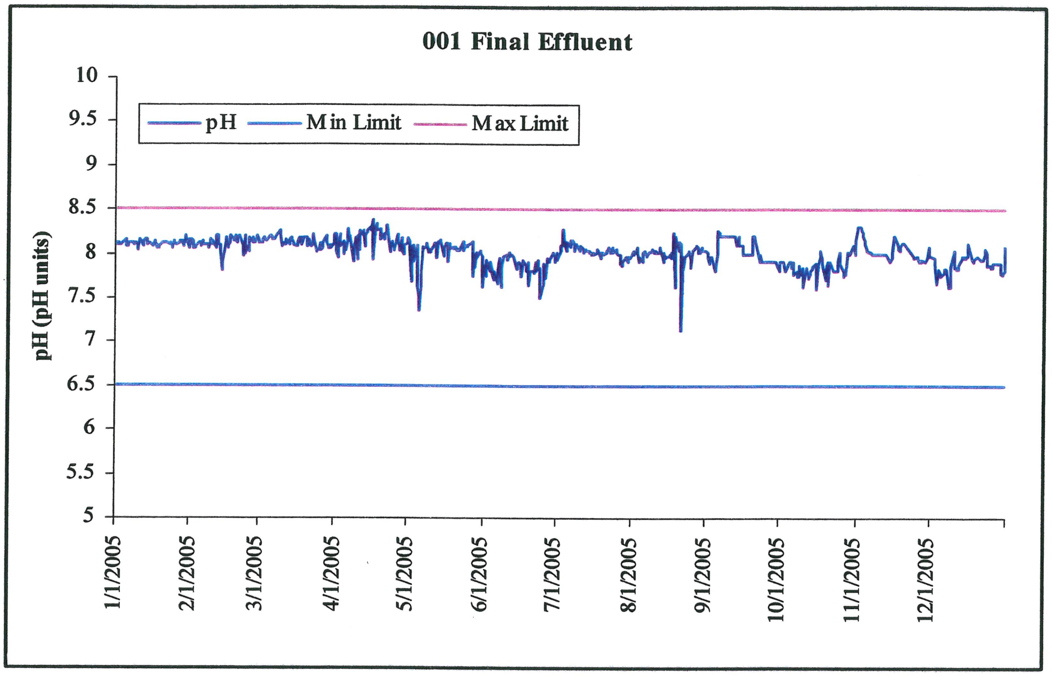


Figure 13: Total Suspended Solids for 001 Influent and Final Effluent, 2005

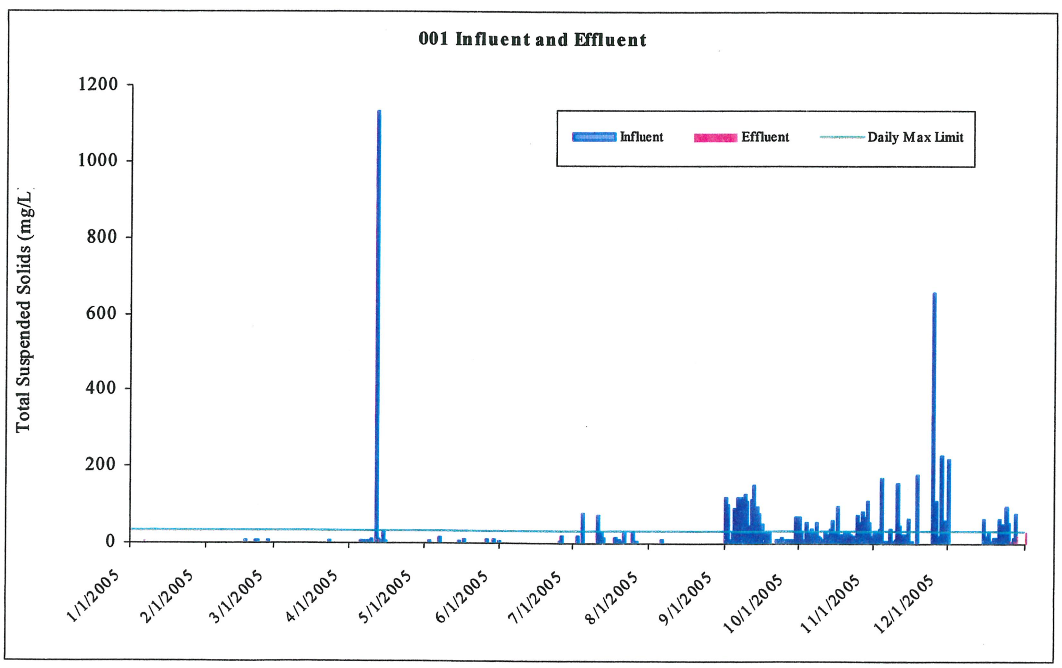
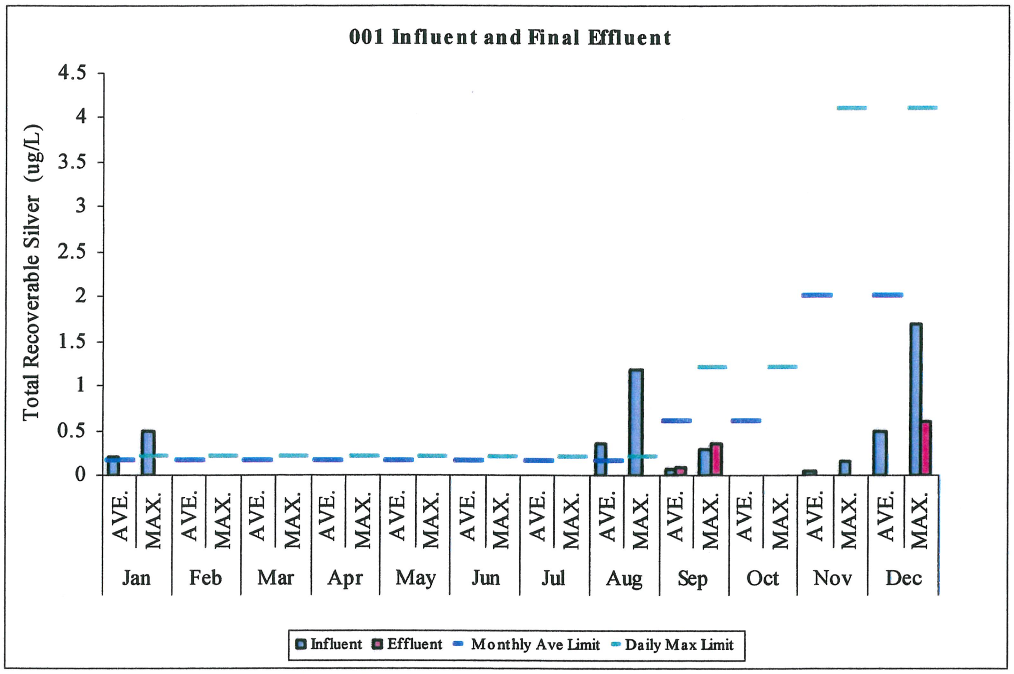


Figure 14: Total Recoverable Metals in 001 Influent and Final Effluent, 2005



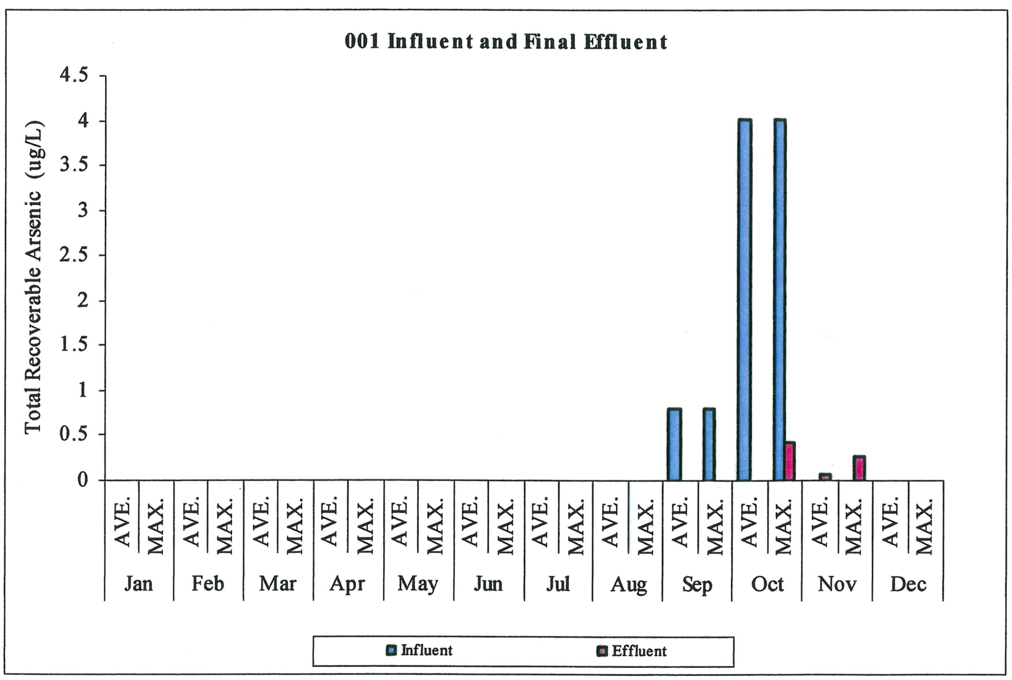
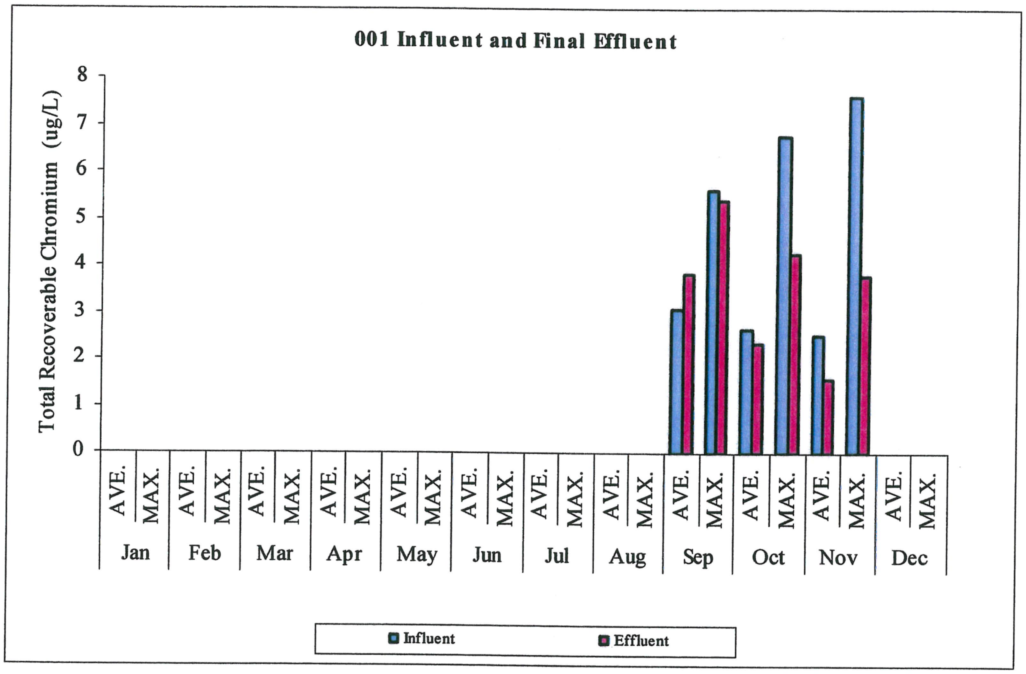


Figure 15: Total Recoverable Metals in 001 Influent and Final Effluent, 2005



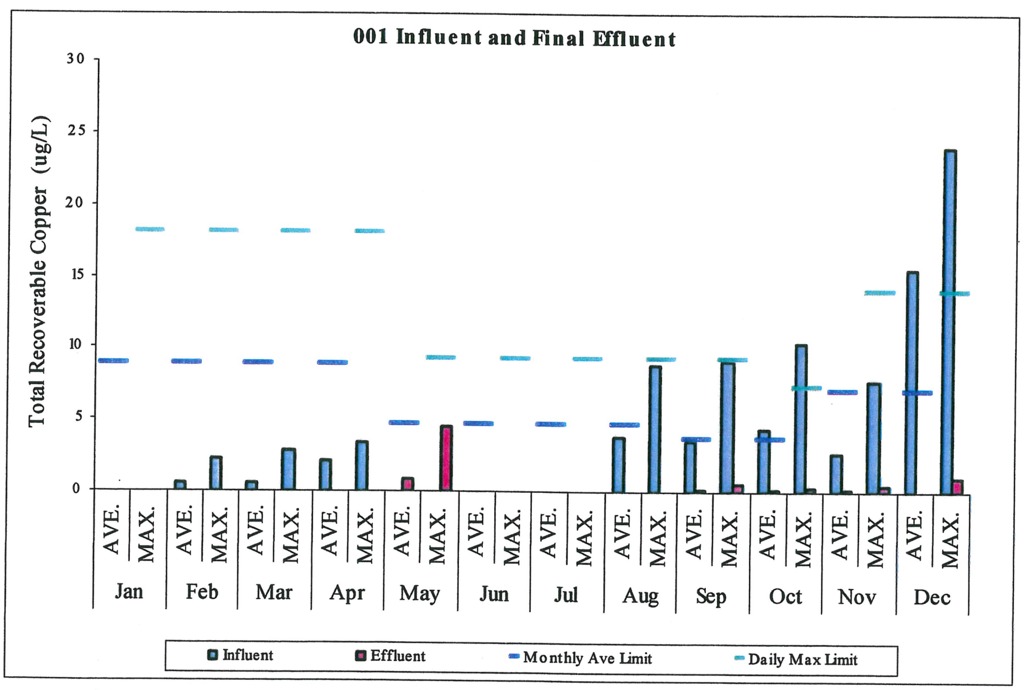
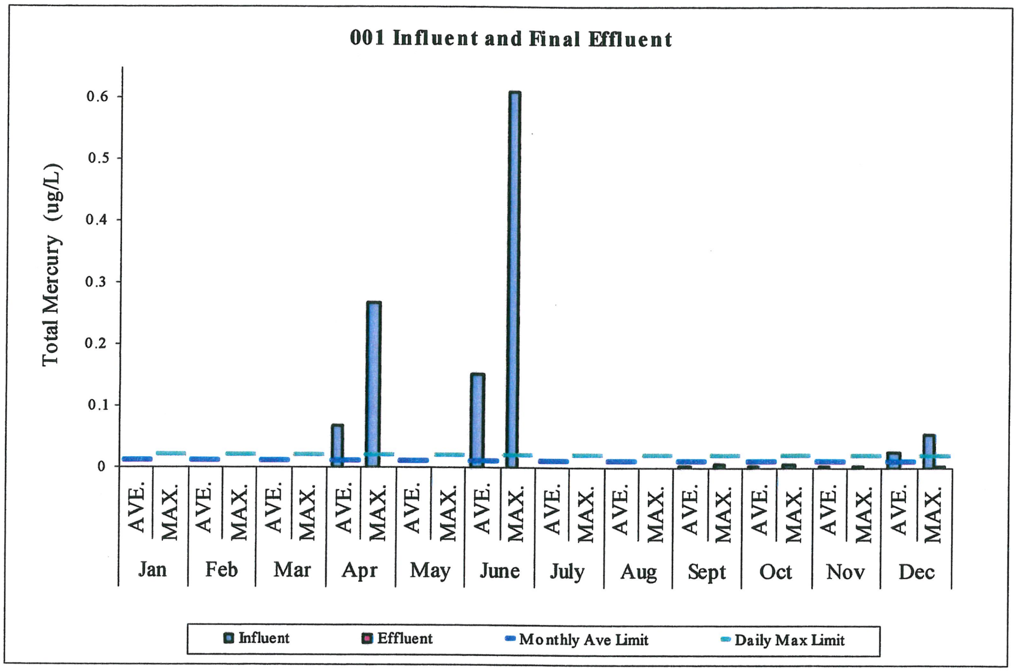


Figure 16: Total Recoverable Metals in 001 Influent and Final Effluent, 2005



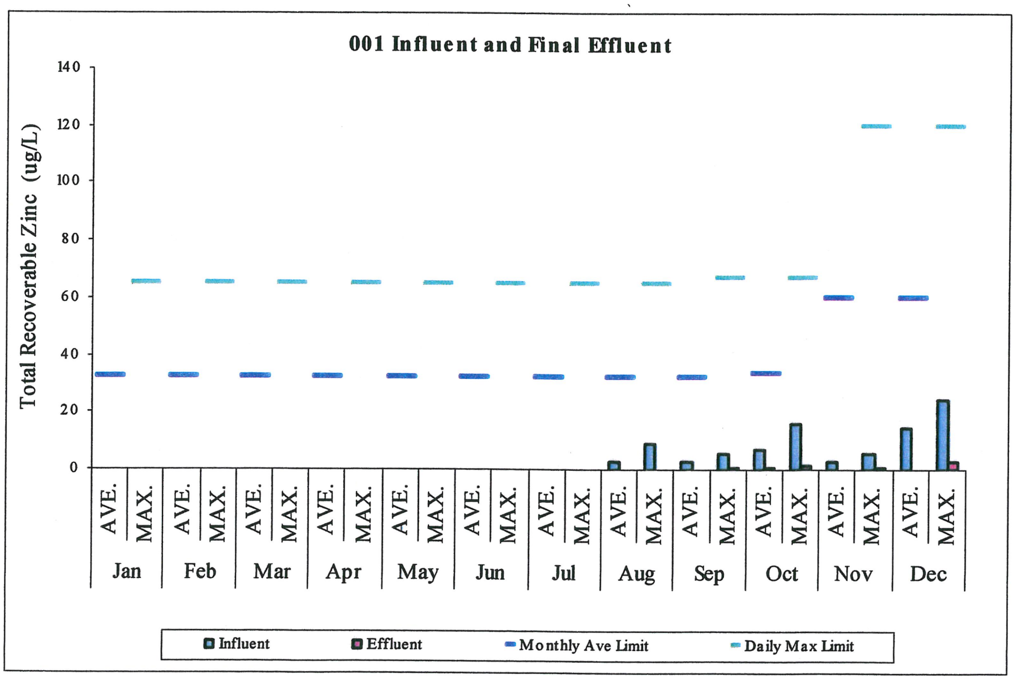
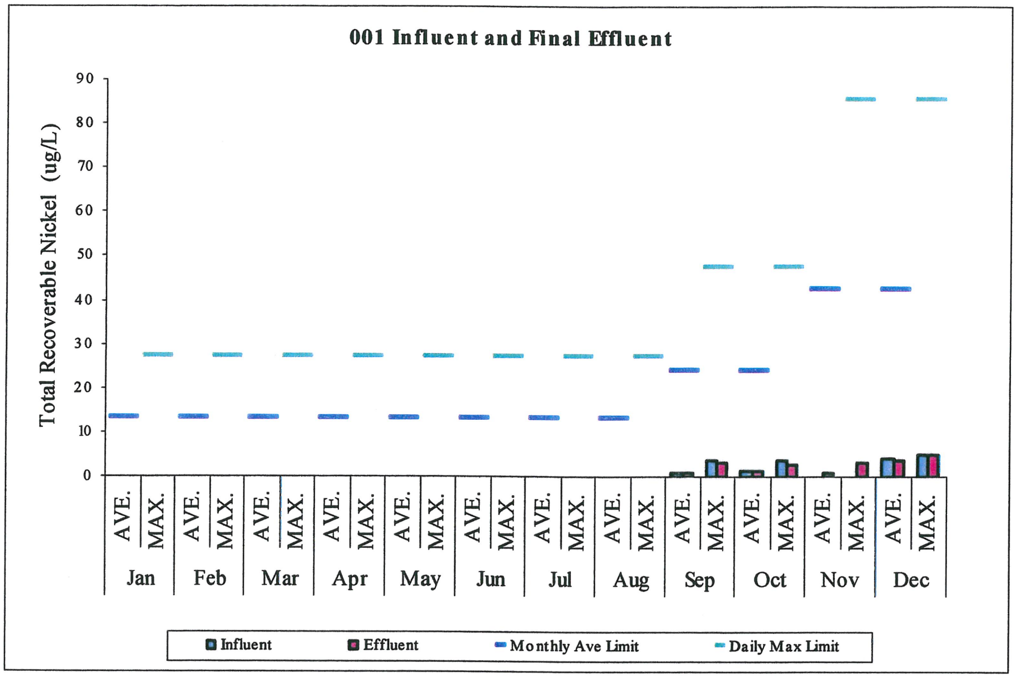


Figure 17: Total Recoverable Metals in 001 Influent and Final Effluent, 2005



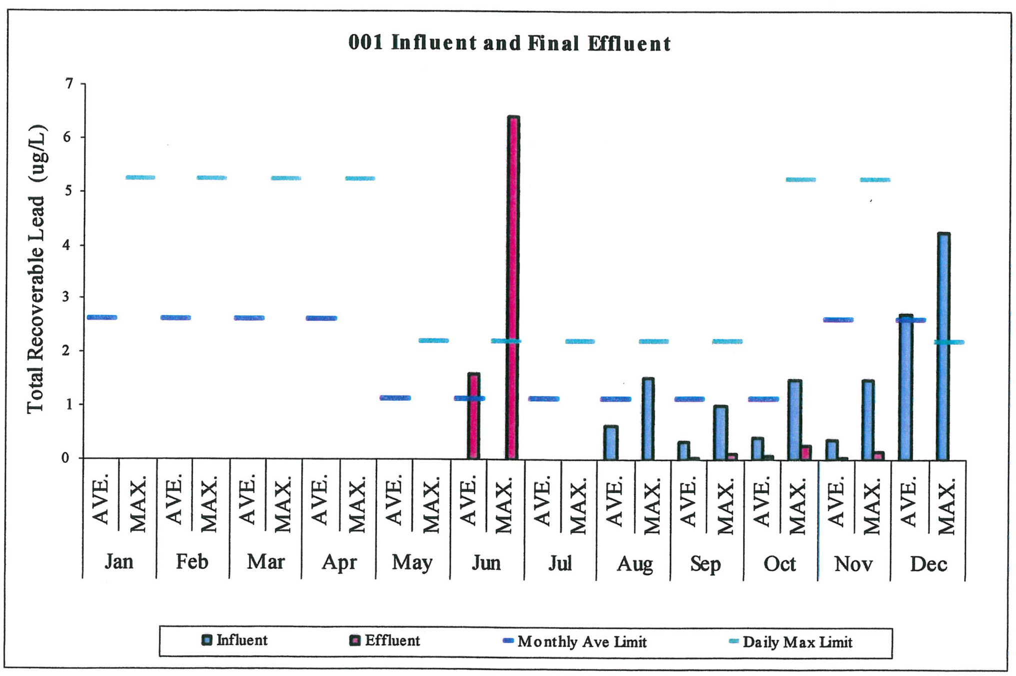
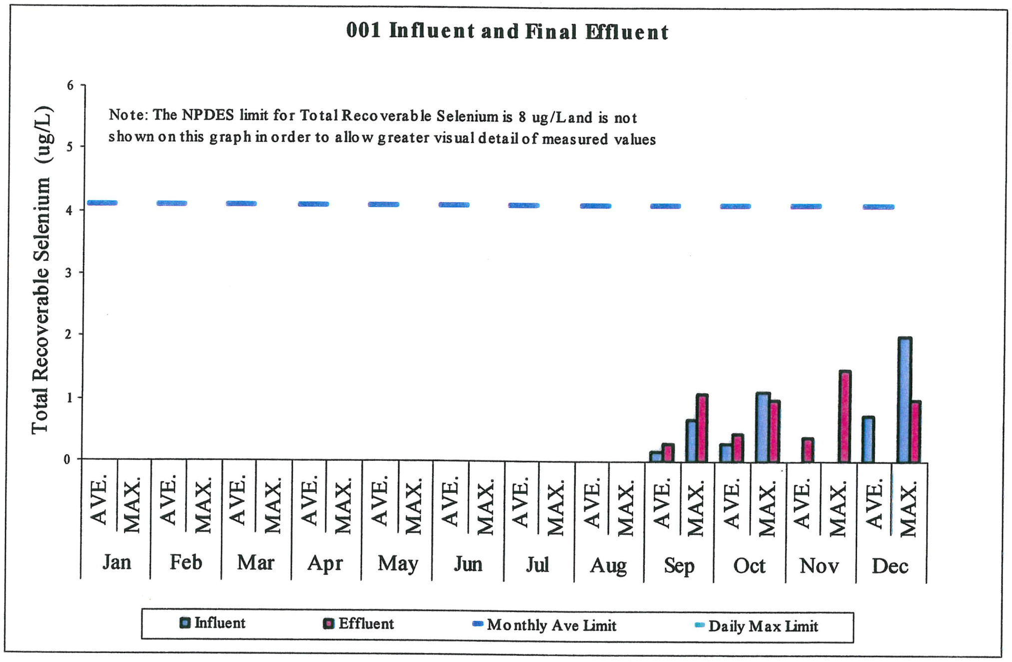
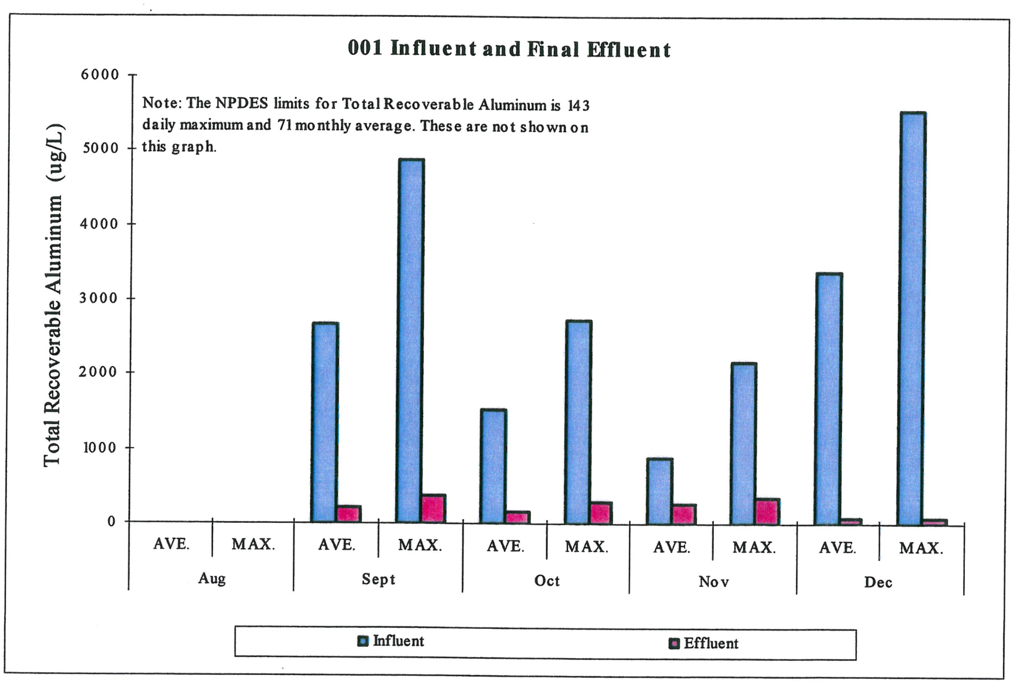


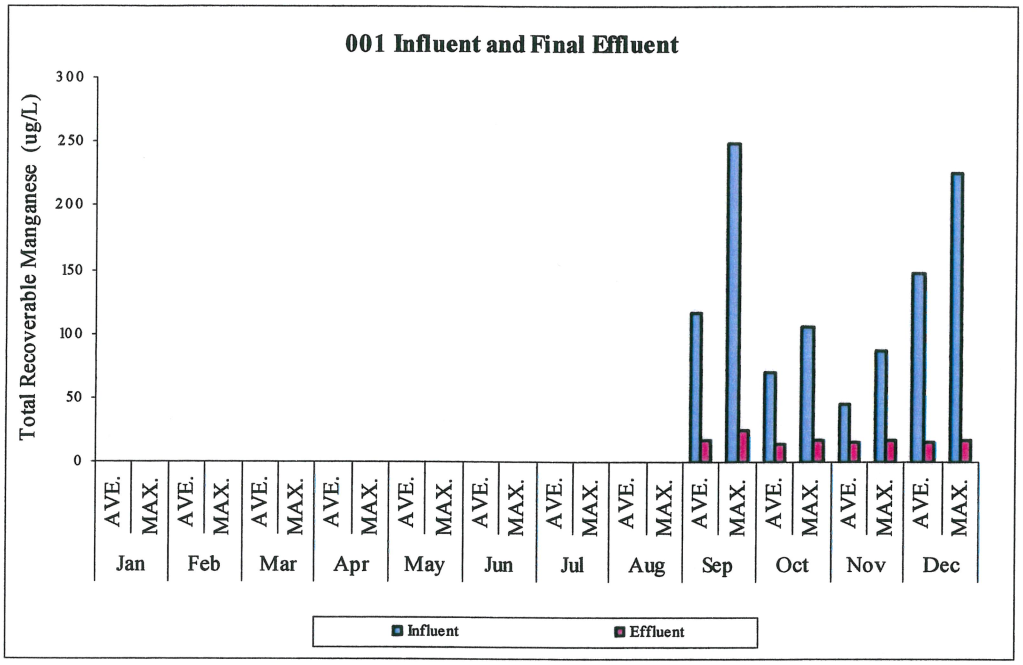
Figure 18: Total Recoverable Metals in 001 Influent and Final Effluent, 2005



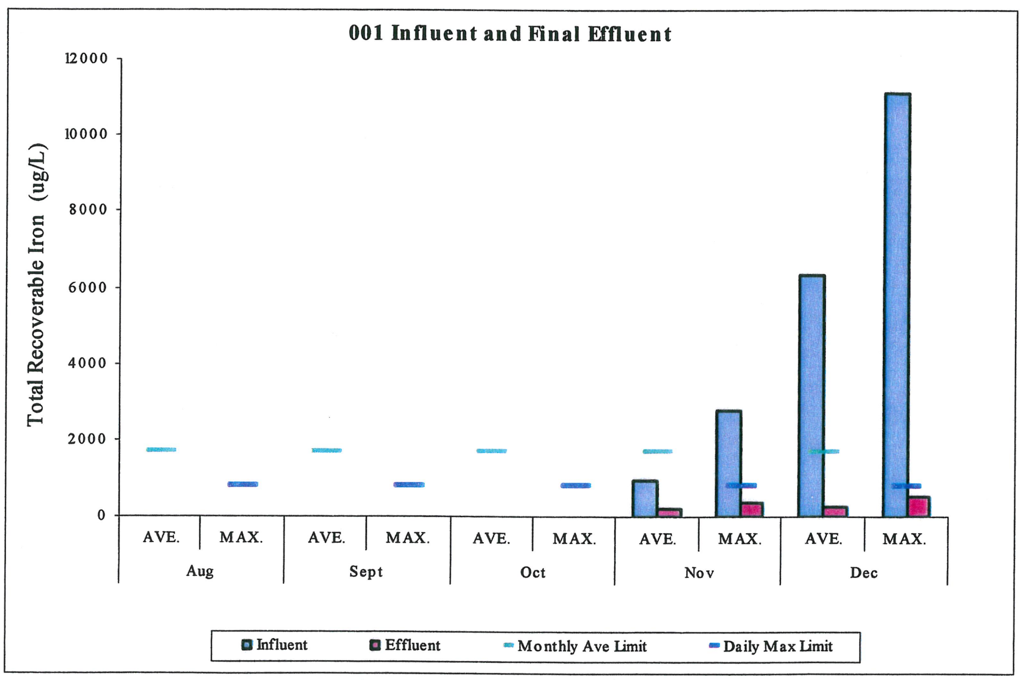


Note: Total Recoverable Aluminum was not collected prior to issuance of Permit No. AK-005057-1

Figure 19: Total Recoverable Metals in 001 Influent and Final Effluent, 2005

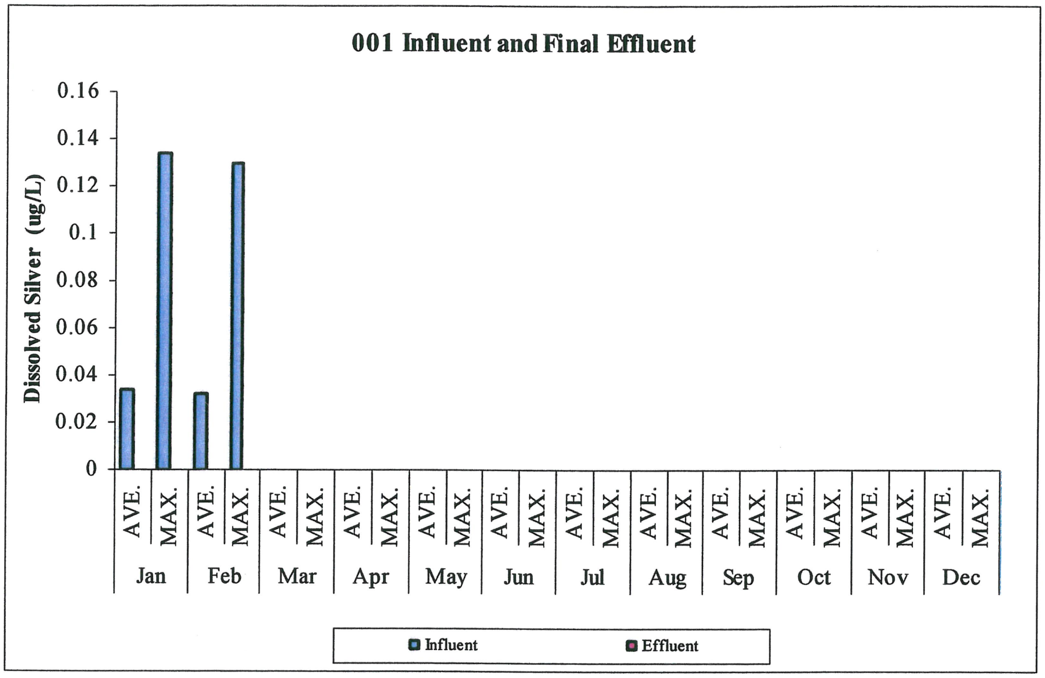


Note: Total Recoverable Manganese was not collected prior to issuance of Permit No. AK_005057



Note: Total Recoverable Iron was not collected prior to issuance of Permit No. AK_005057

Figure 20: Dissolved Metals in 001 Influent and Final Effluent, 2005



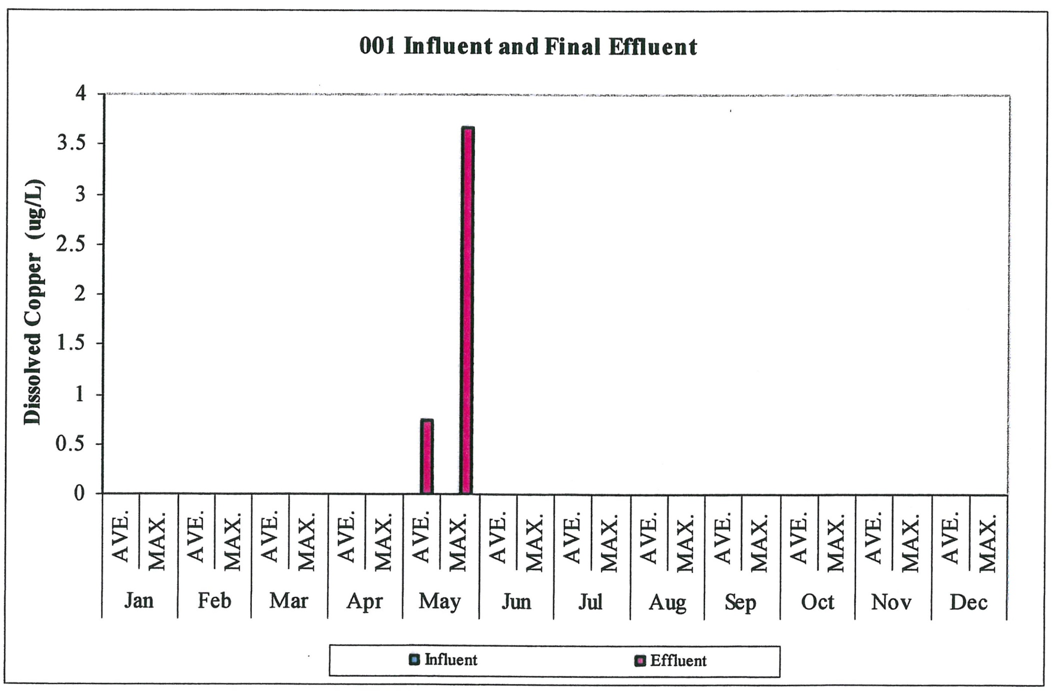
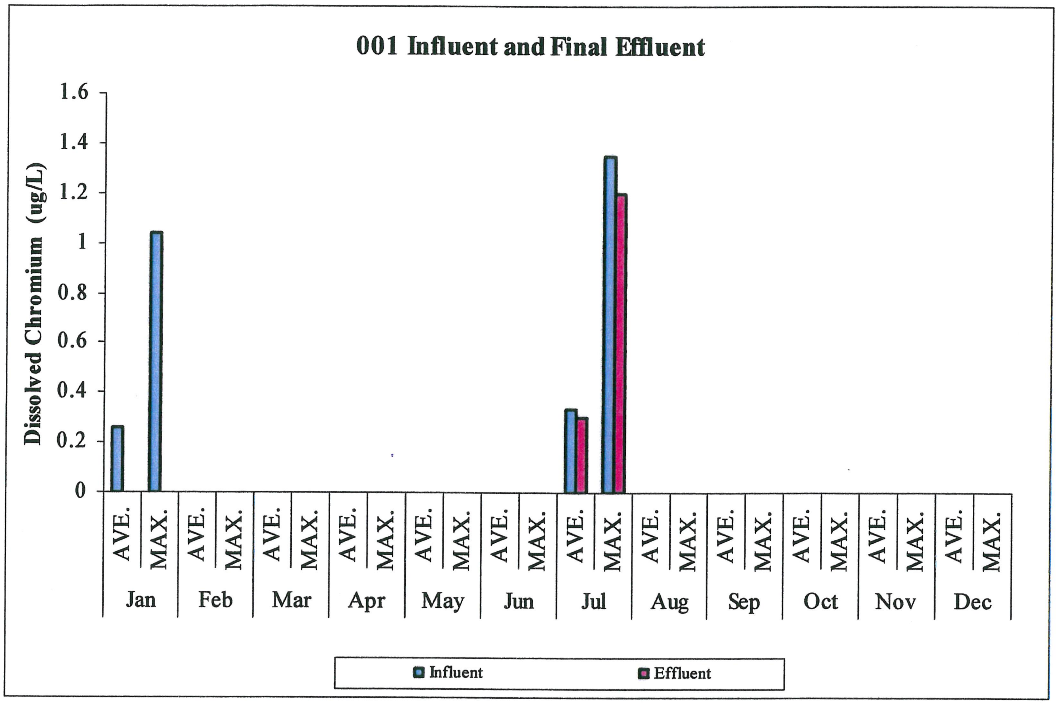


Figure 21: Dissolved Metals in 001 Influent and Final Effluent, 2005



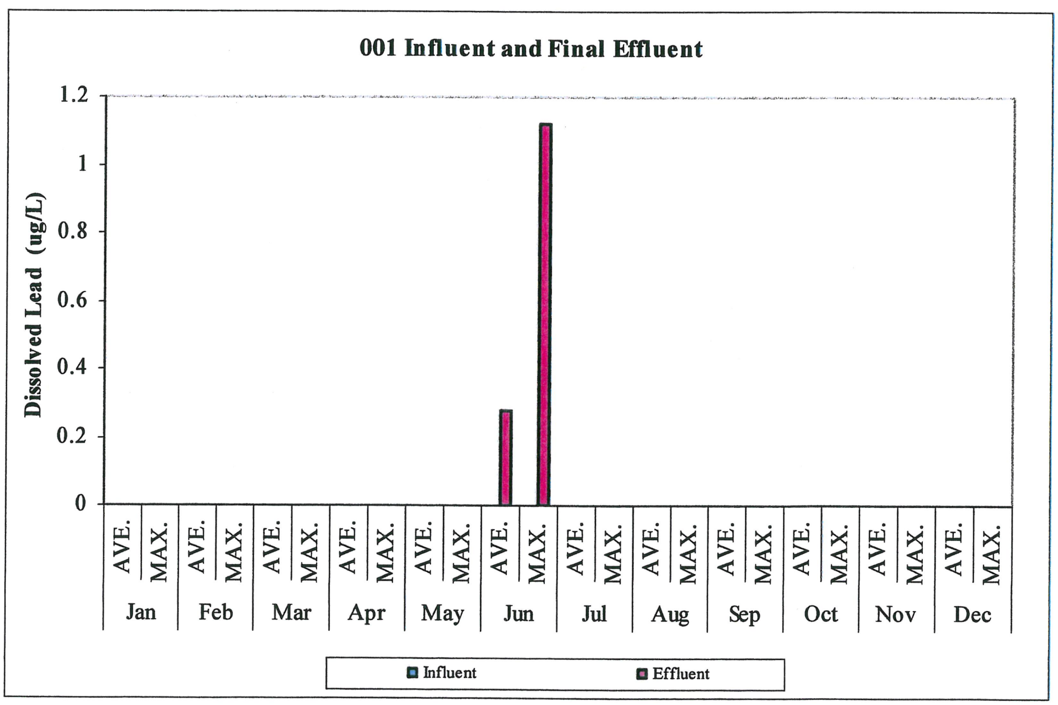
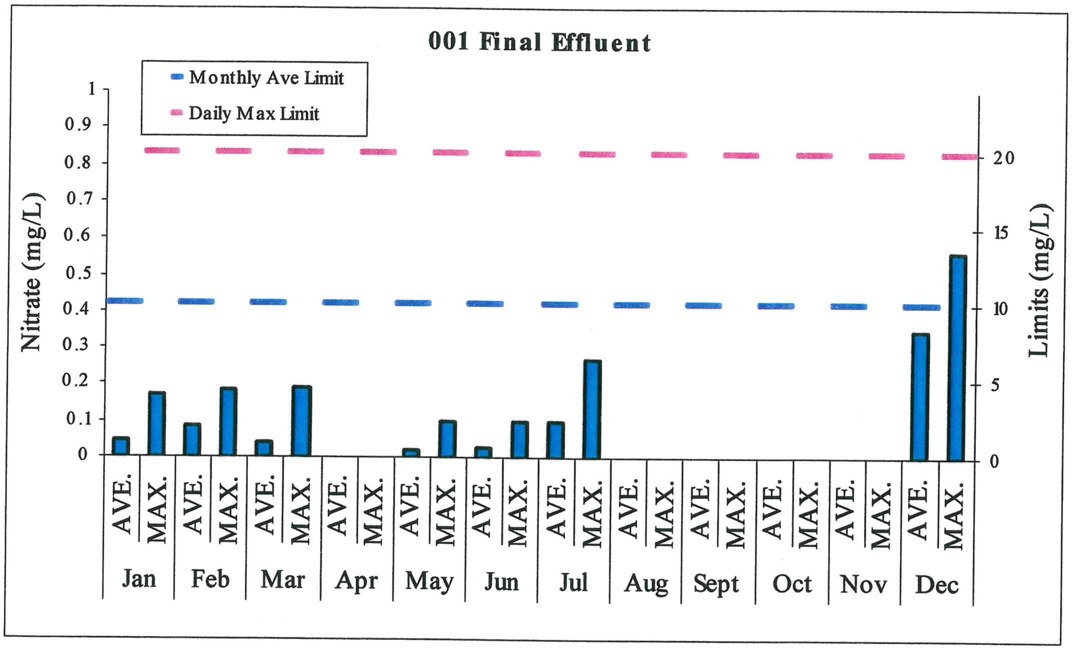


Figure 22: Physical and General Parameters in 001 Final Effluent, 2005



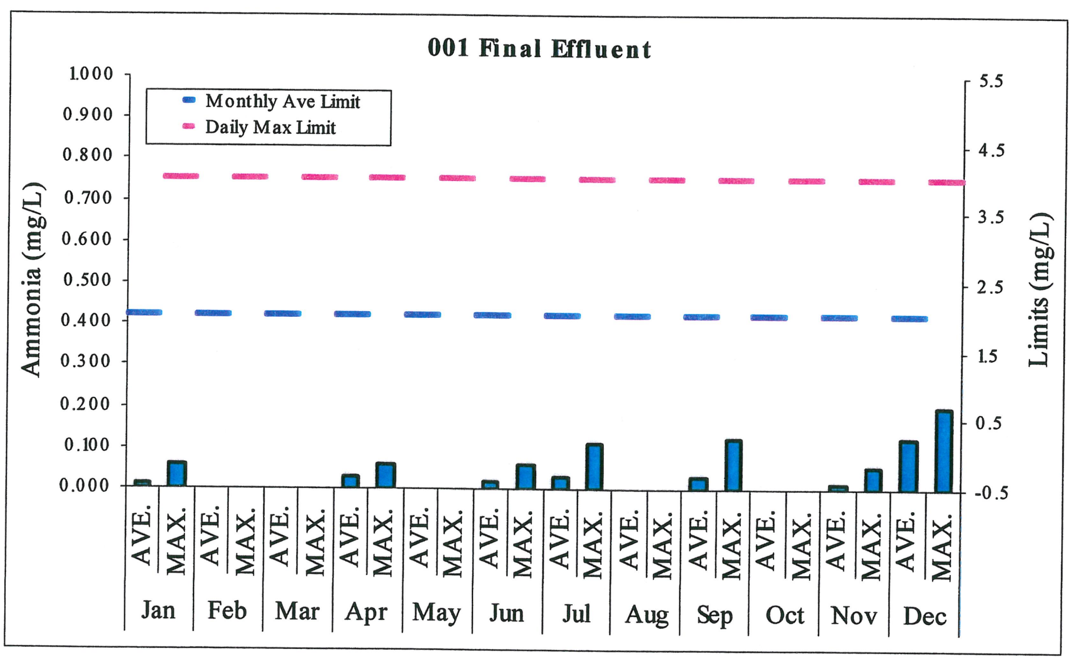
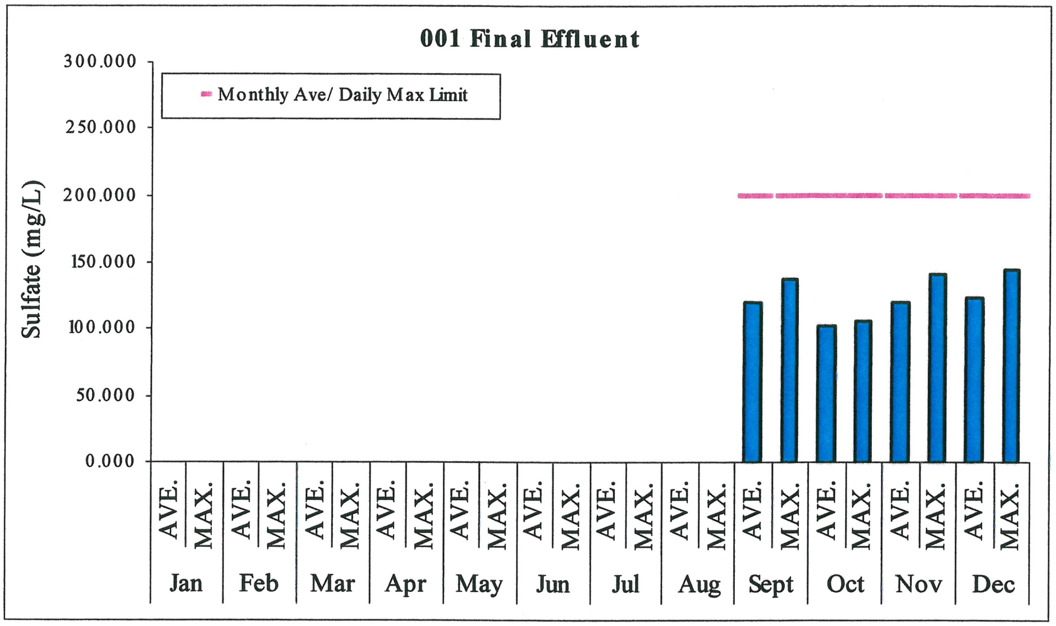


Figure 23: Physical and General Parameters in 001 Final Effluent, 2005



Note: Sulfate was not collected prior to issuance of Permit No. AK_005057

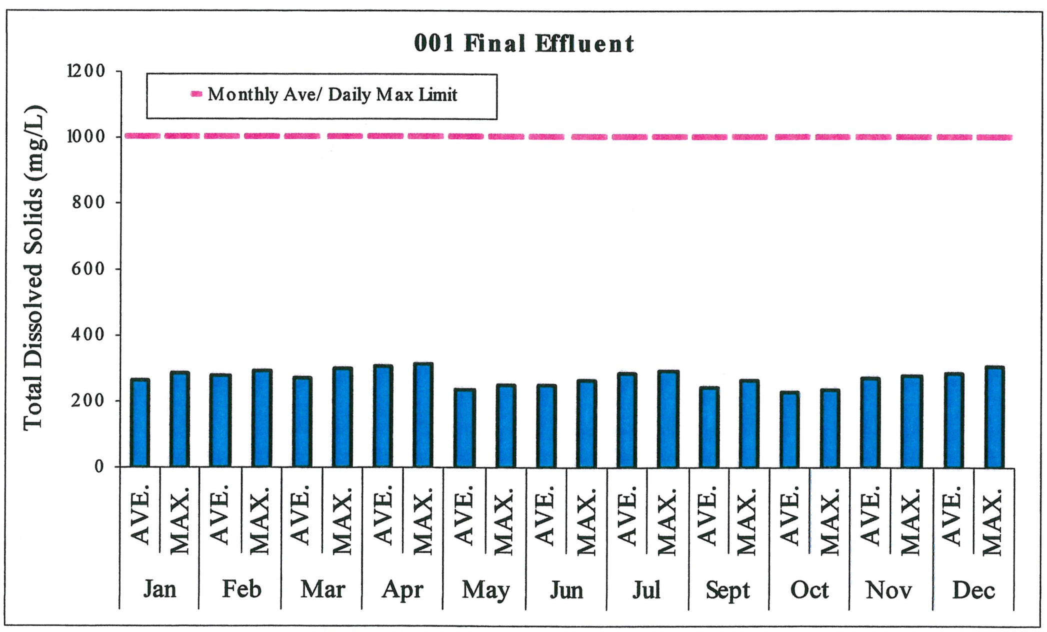
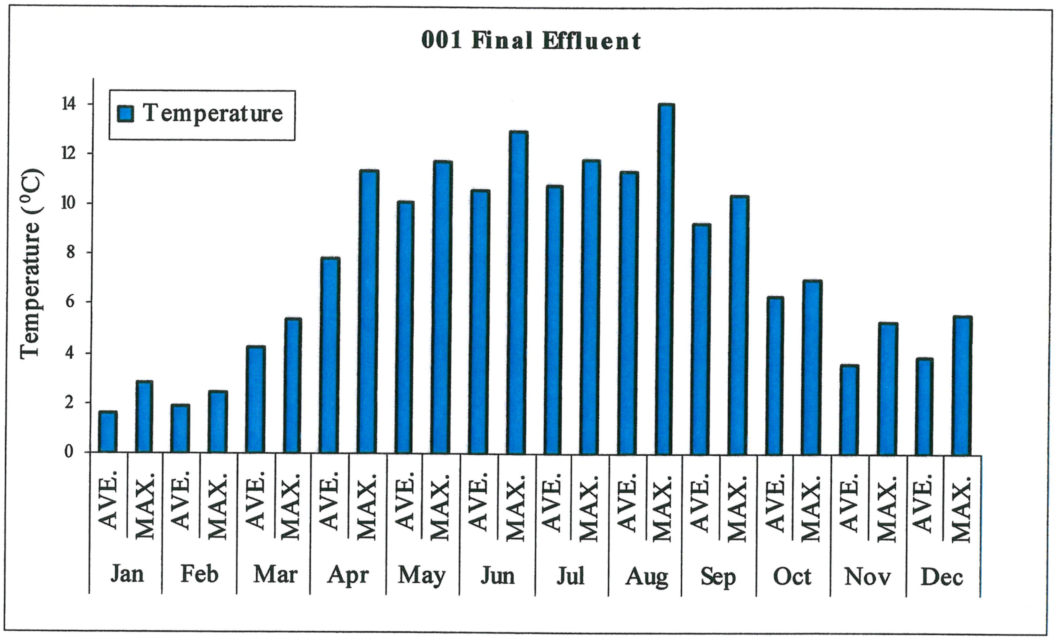


Figure 24: Physical and General Parameters in 001 Final Effluent, 2005



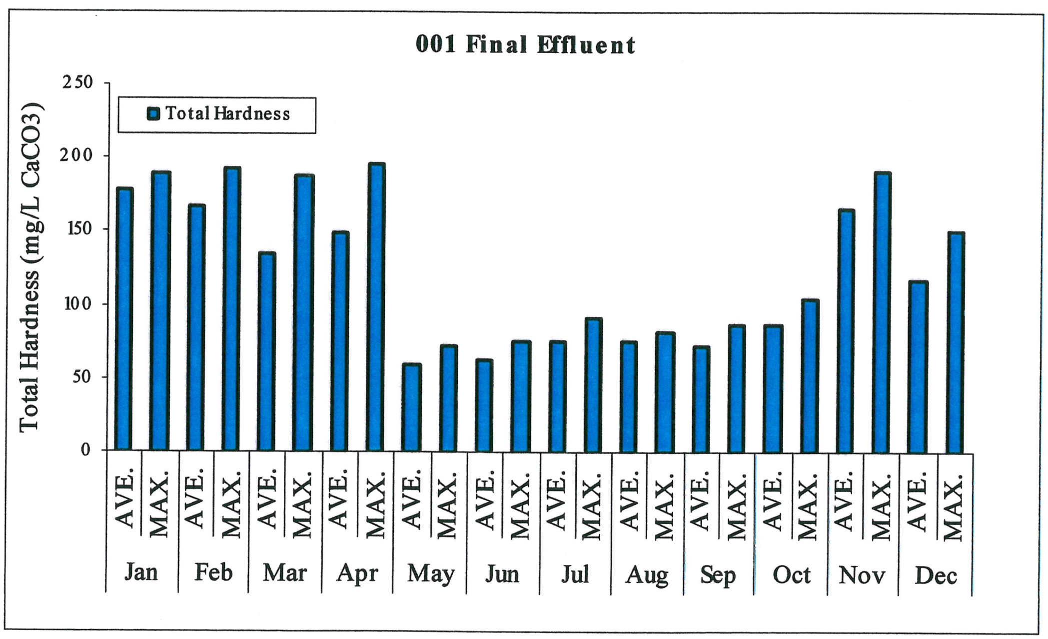


Figure 25: Physical and General Parameters in 001 Final Effluent, 2005

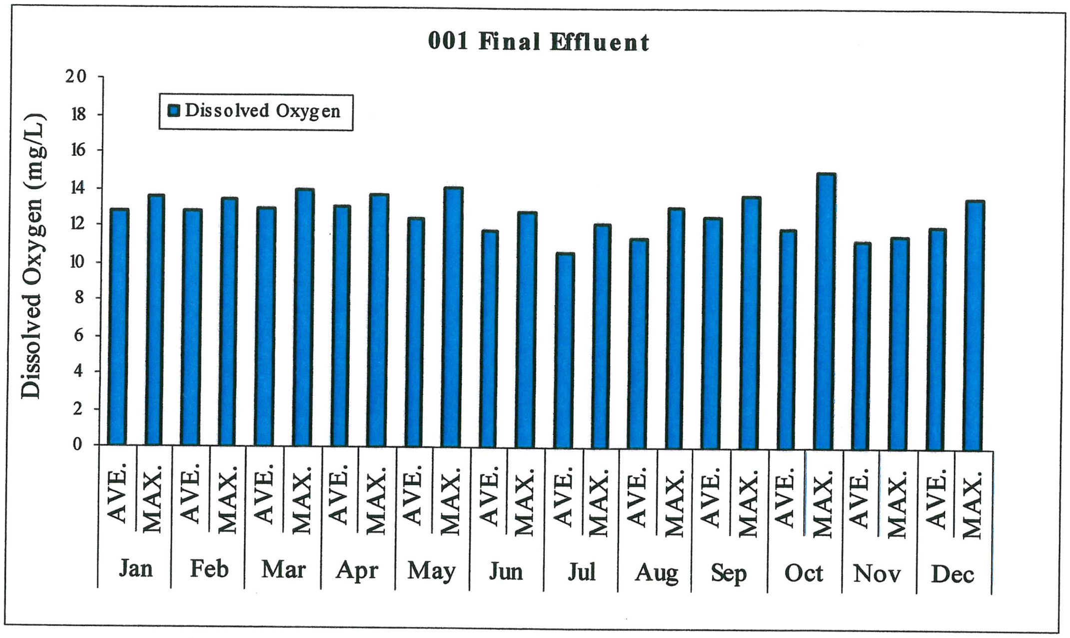
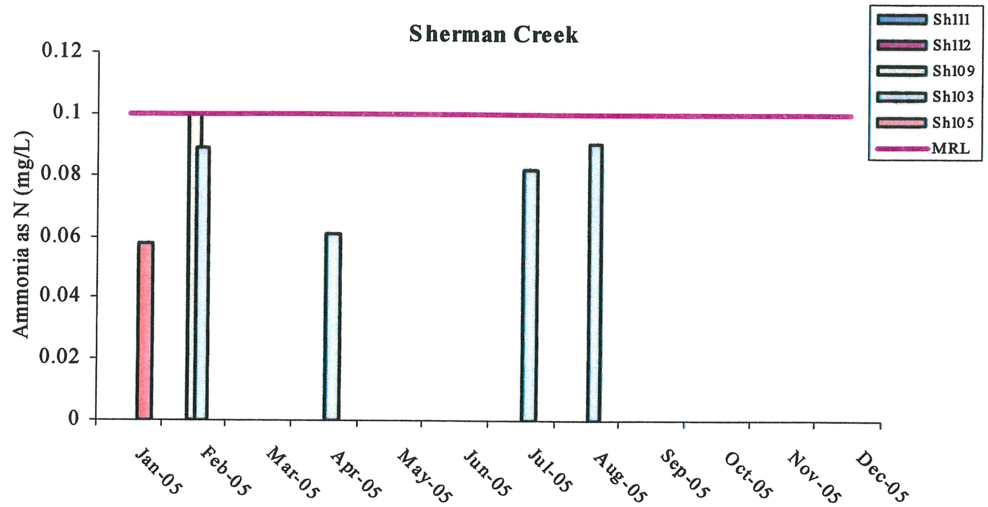
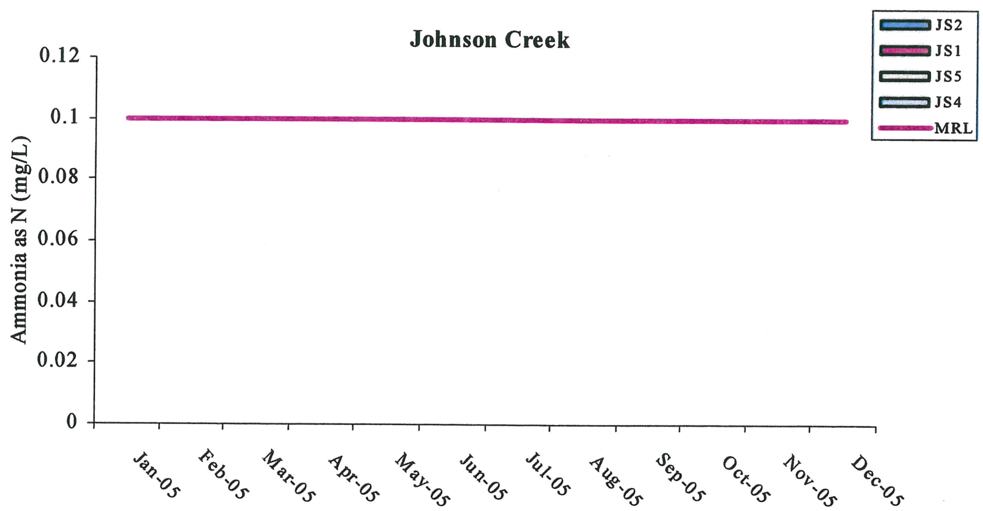


Figure 26. Ammonia as Nitrogen concentrations in Receiving Water, 2005





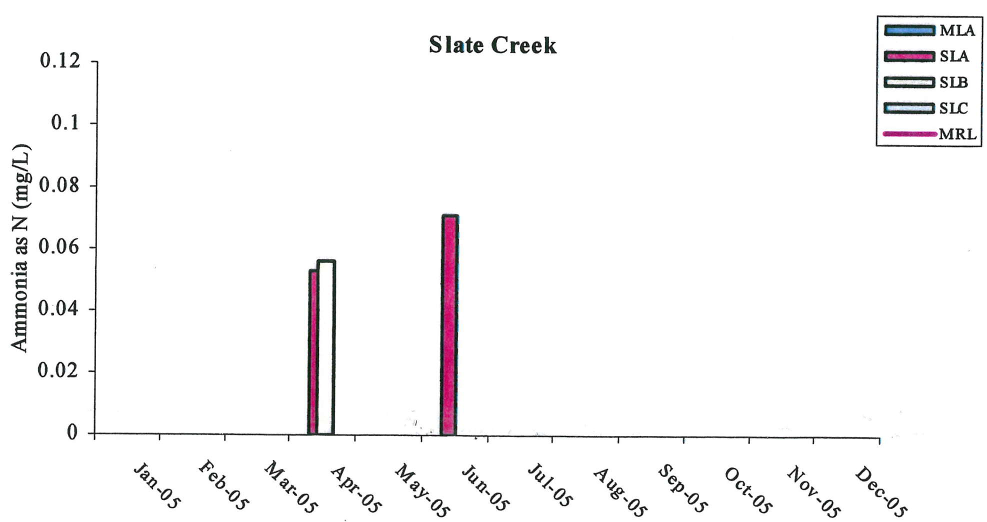
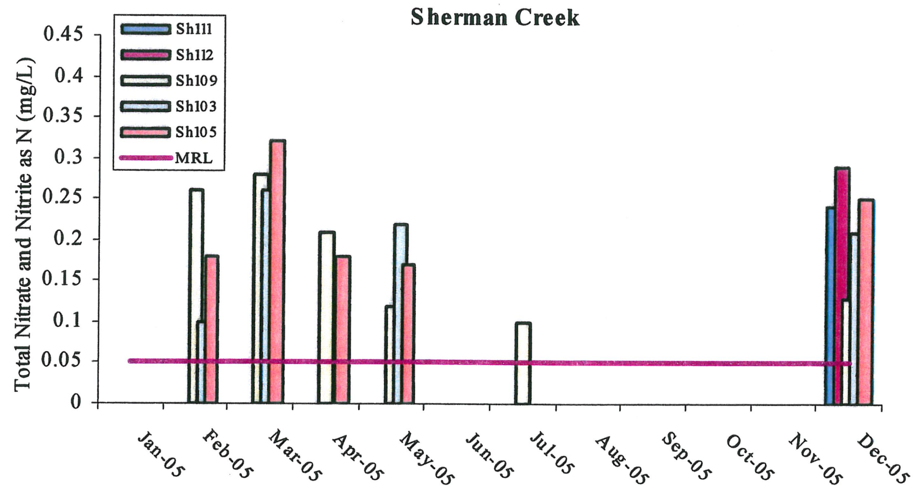
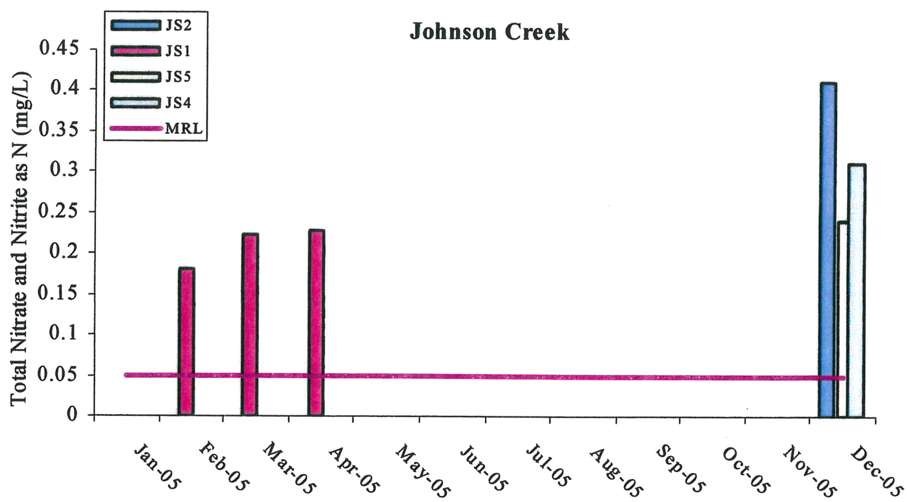


Figure 27. Total Nitrate and Nitrite as Nitrogen concentrations in Receiving Water, 2005





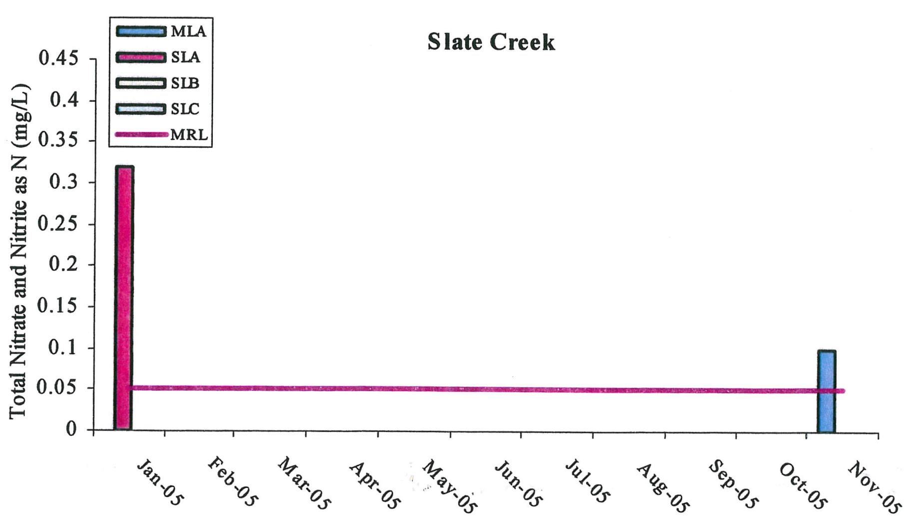
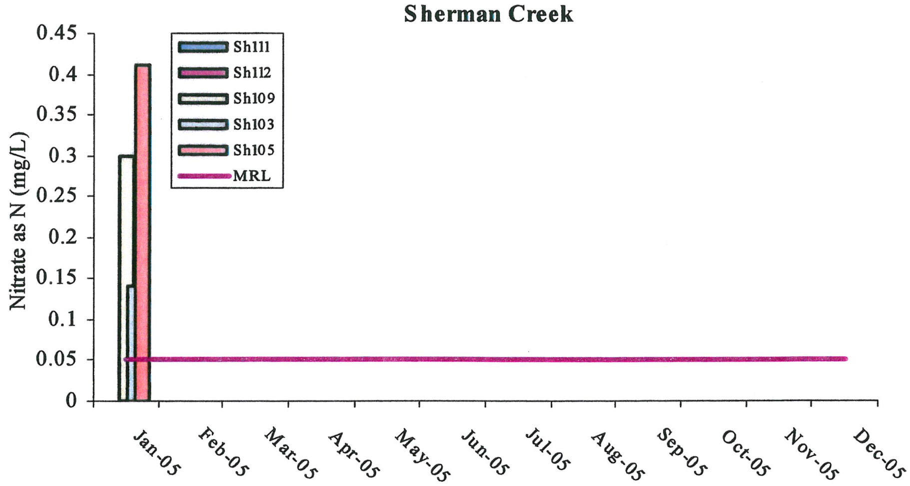
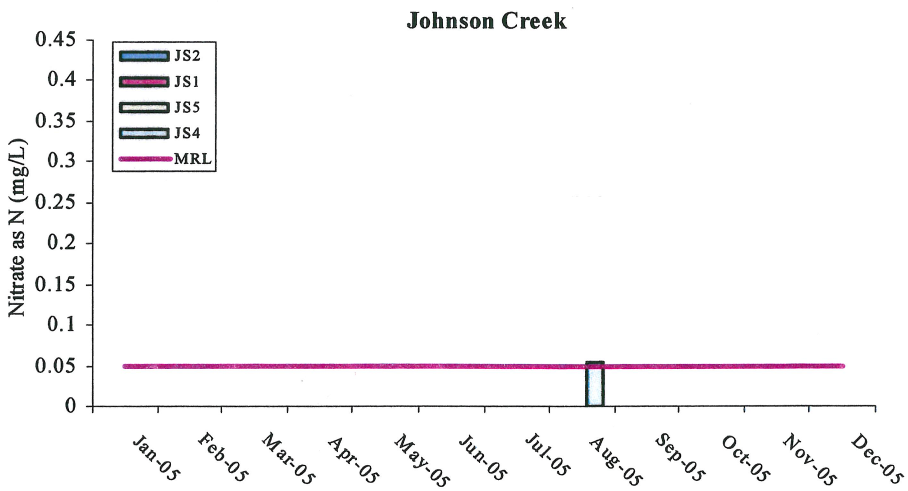


Figure 28. Nitrate as Nitrogen concentrations in Receiving Water, 2005





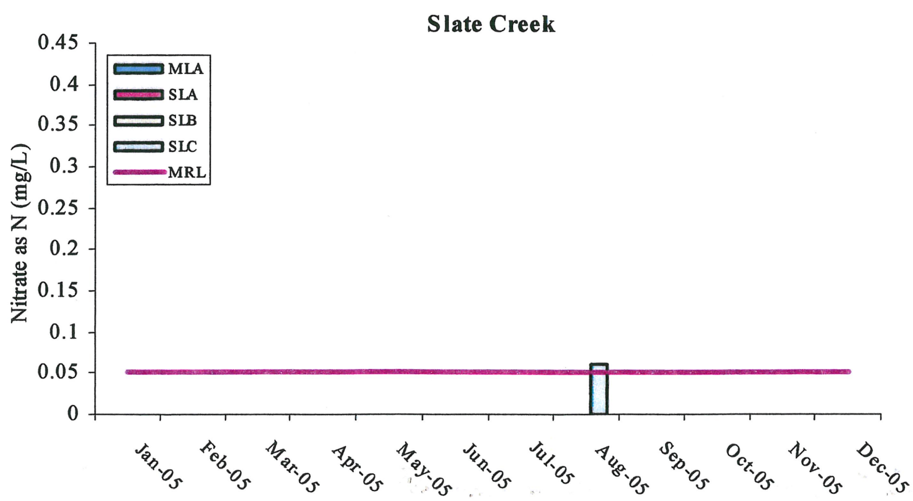
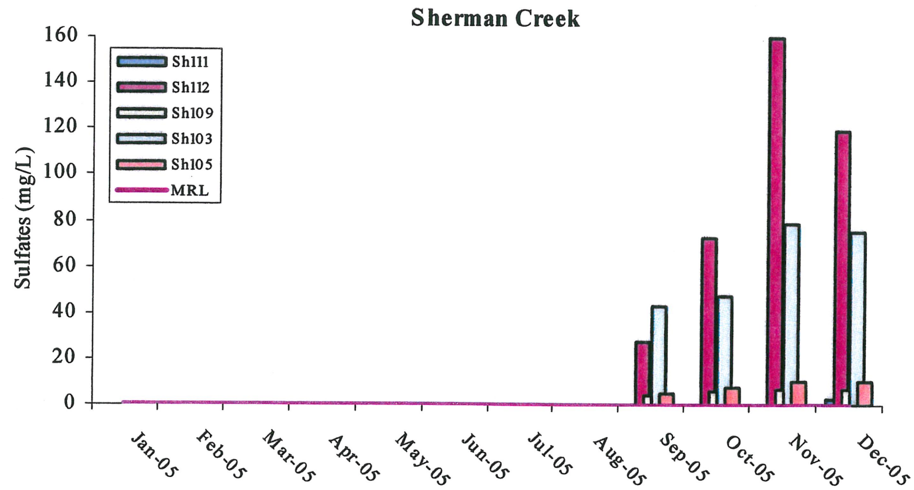
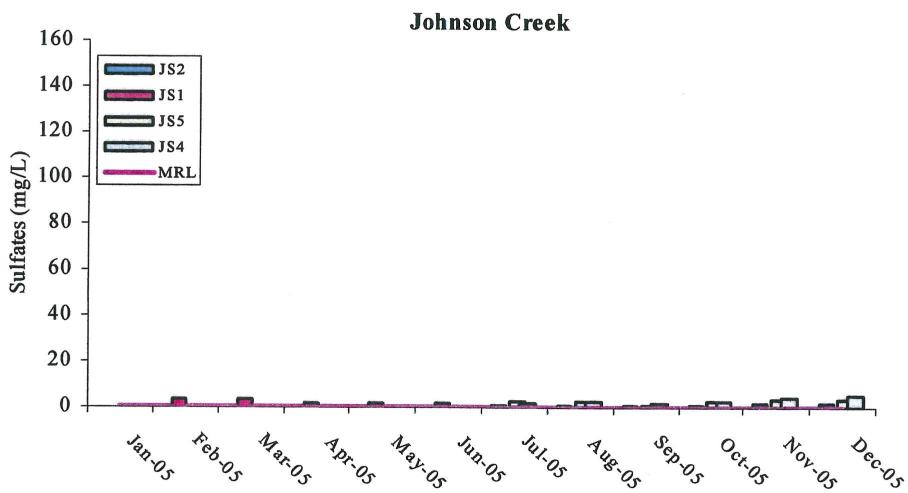


Figure 29. Sulfate concentrations in Receiving Water, 2005





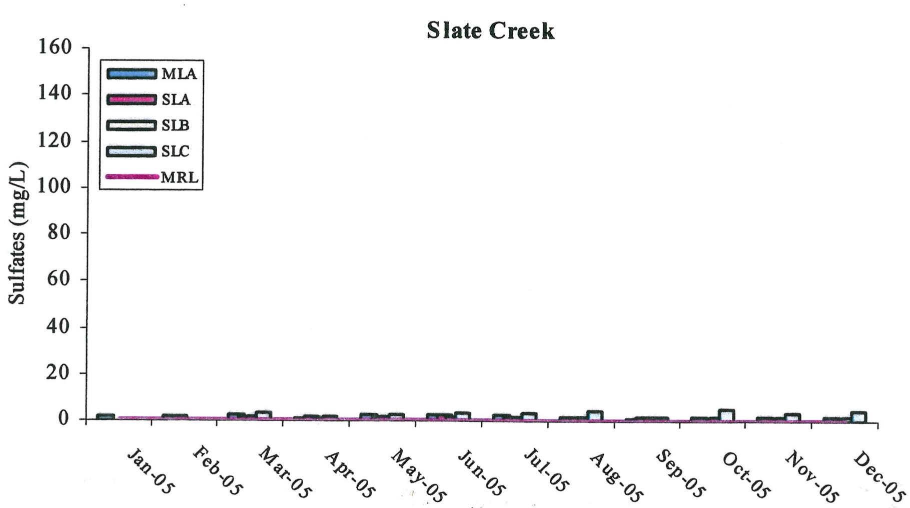
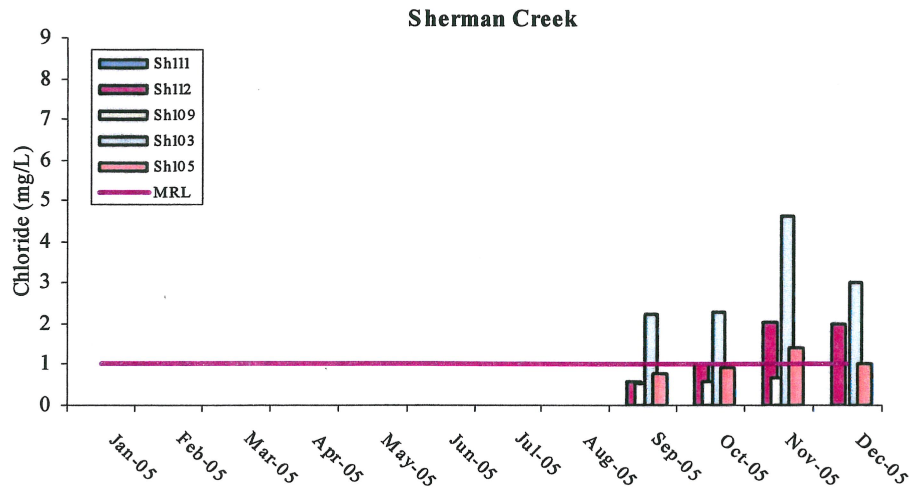
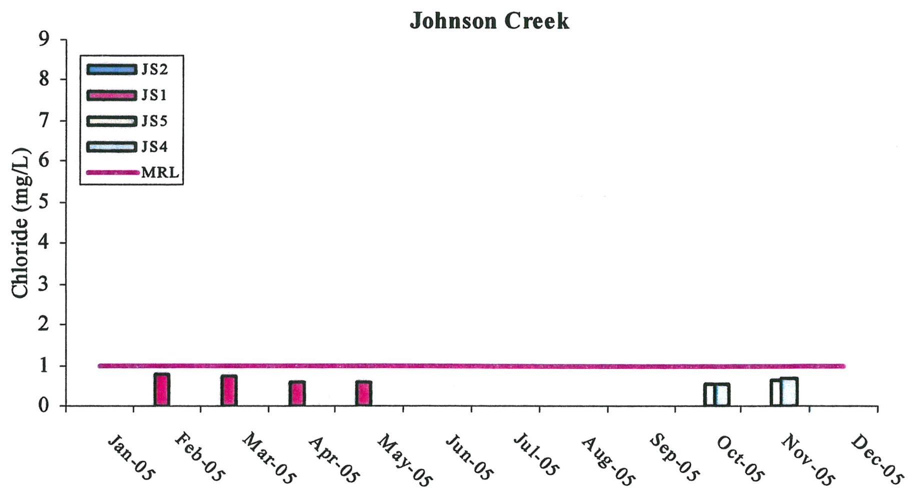


Figure 30. Chloride concentrations in Receiving Water, 2005





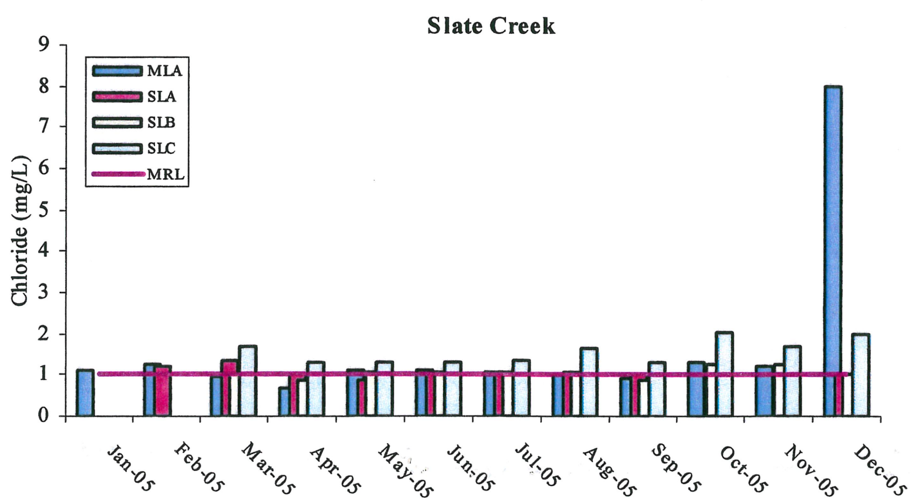
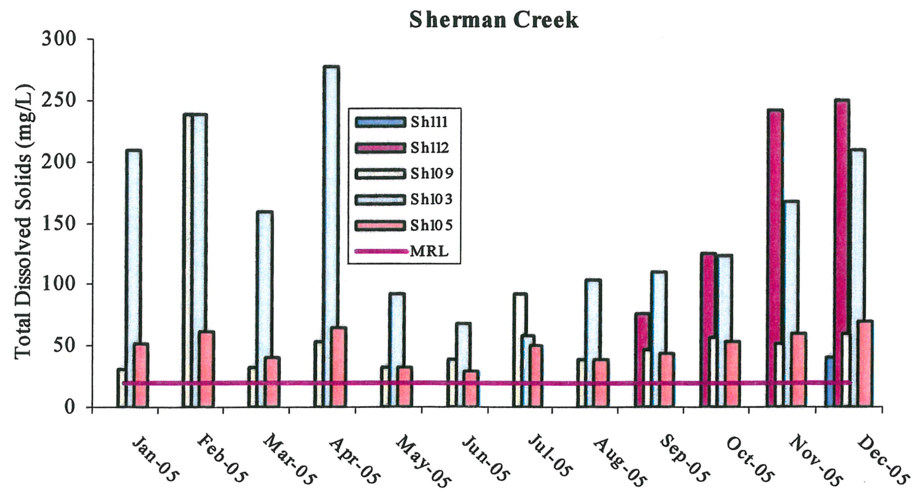
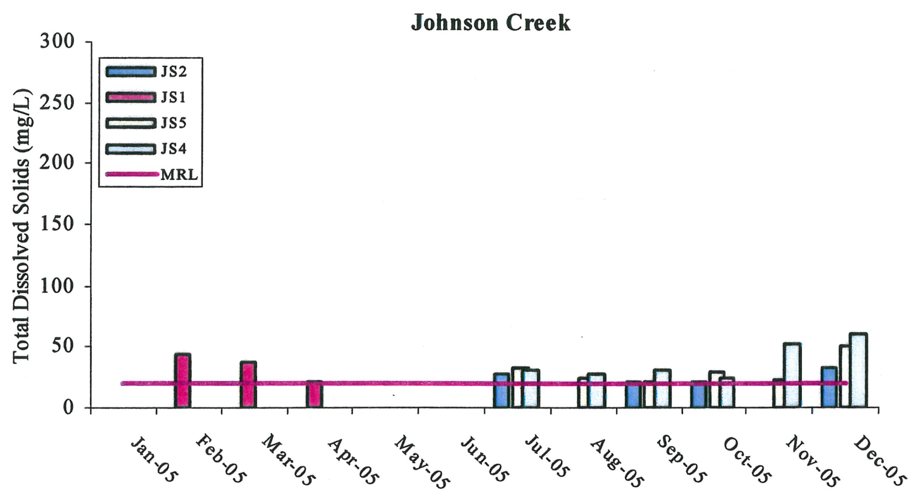


Figure 31. Total Dissolved Solids in Receiving Water, 2005





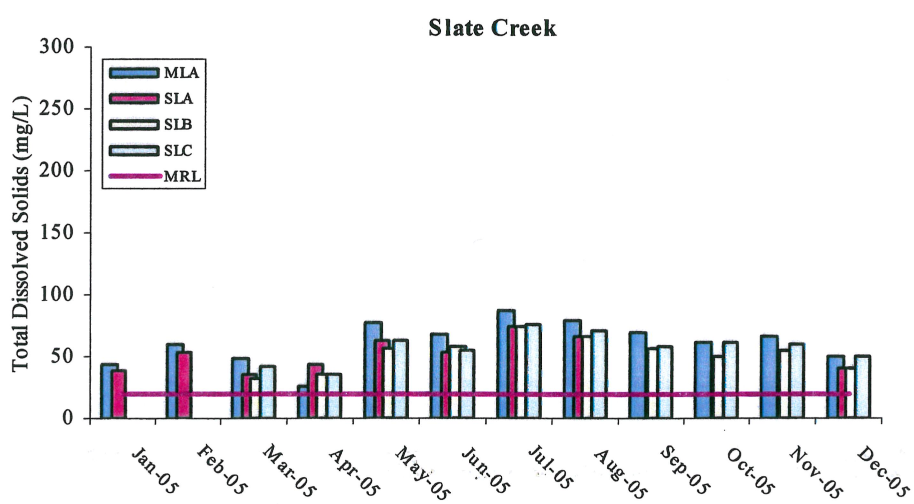
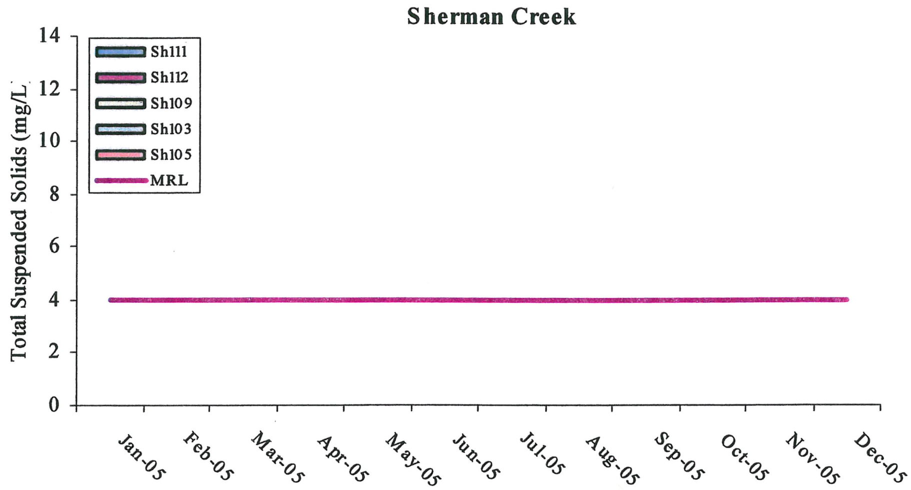
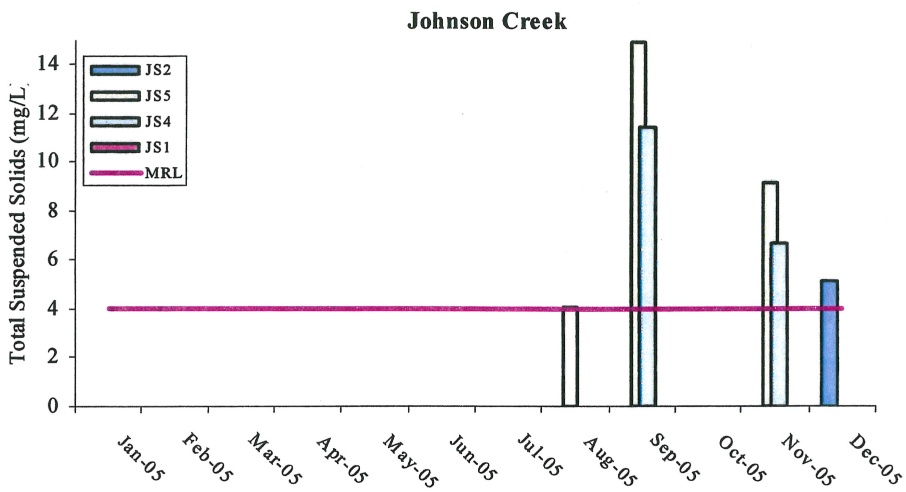


Figure 32. Total Suspended Solids in Receiving Water, 2005





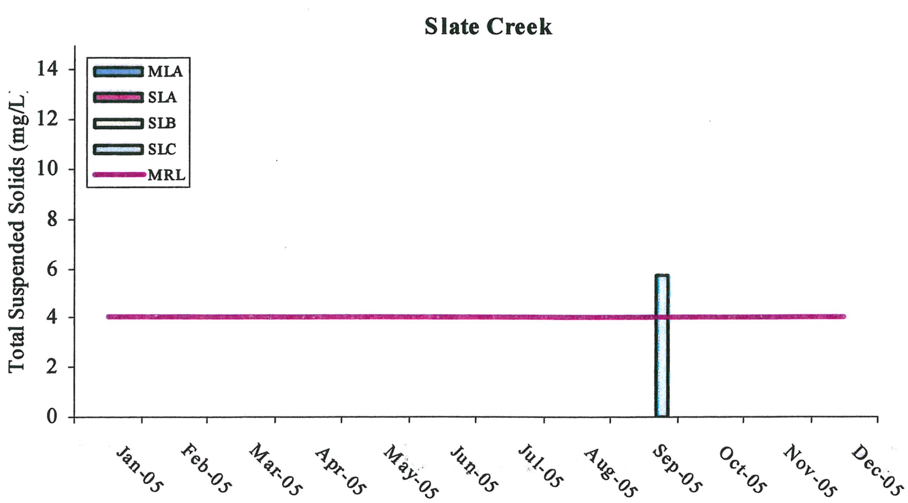
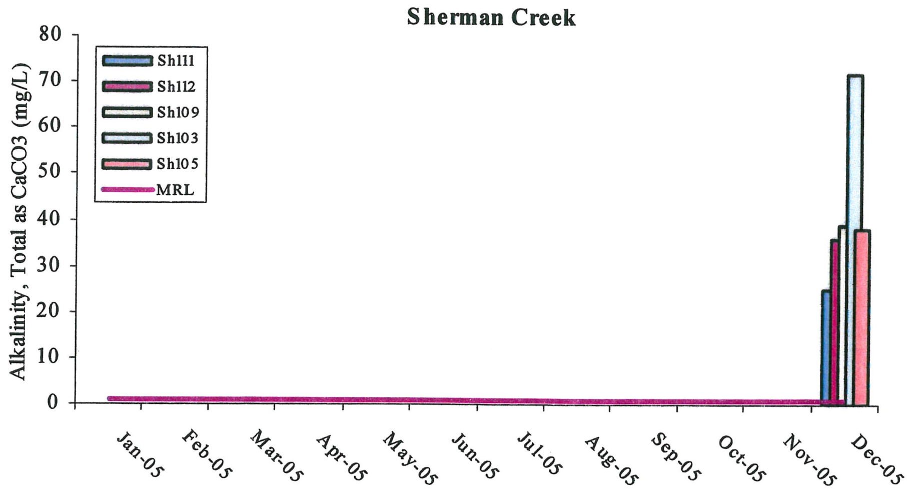
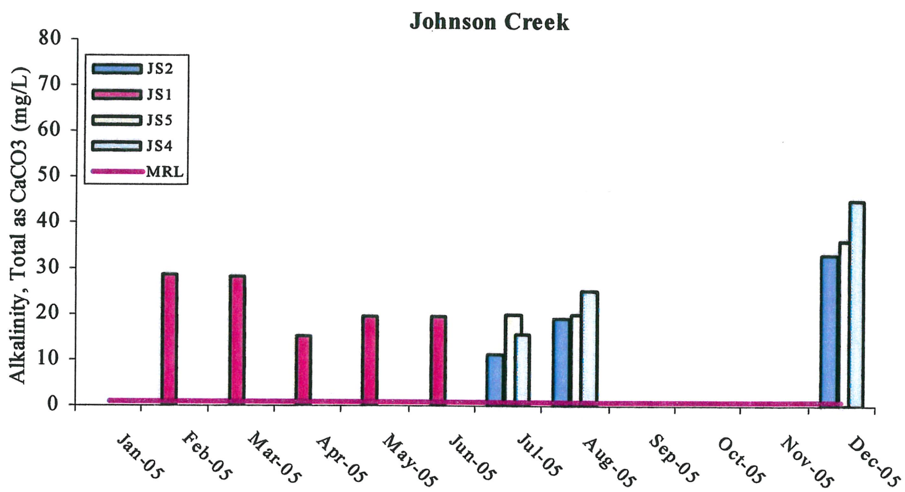


Figure 33. Alkalinity, Total as $CaCO_3$ in Receiving Water, 2005





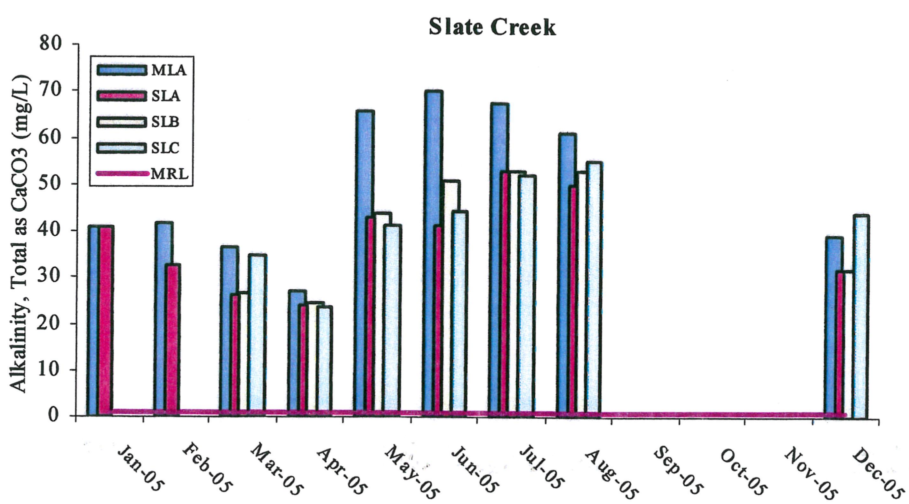
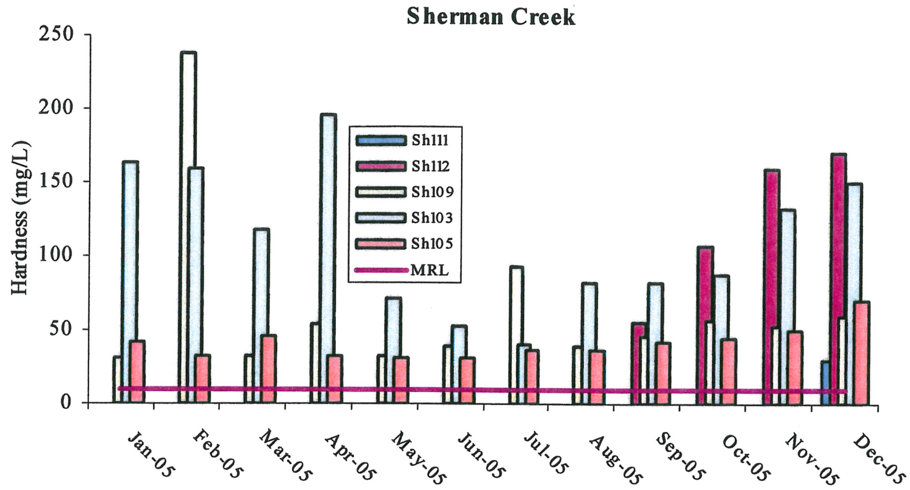
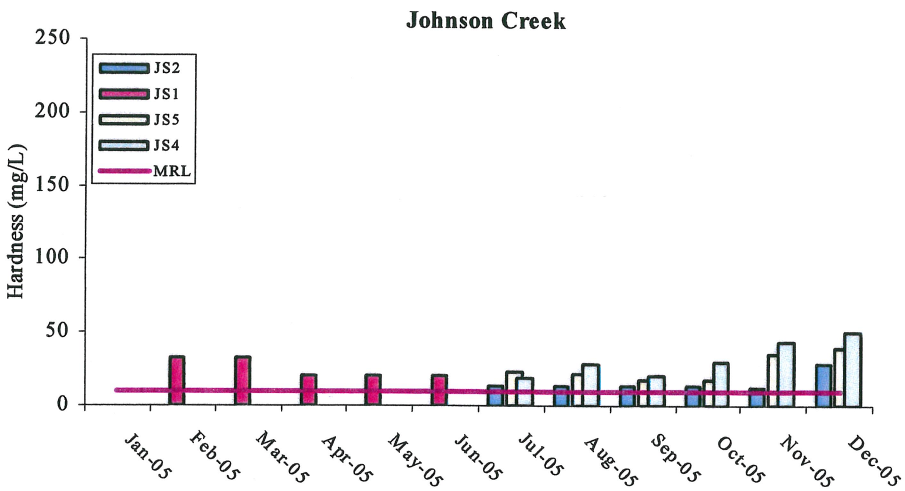


Figure 34. Hardness in Receiving Water, 2005





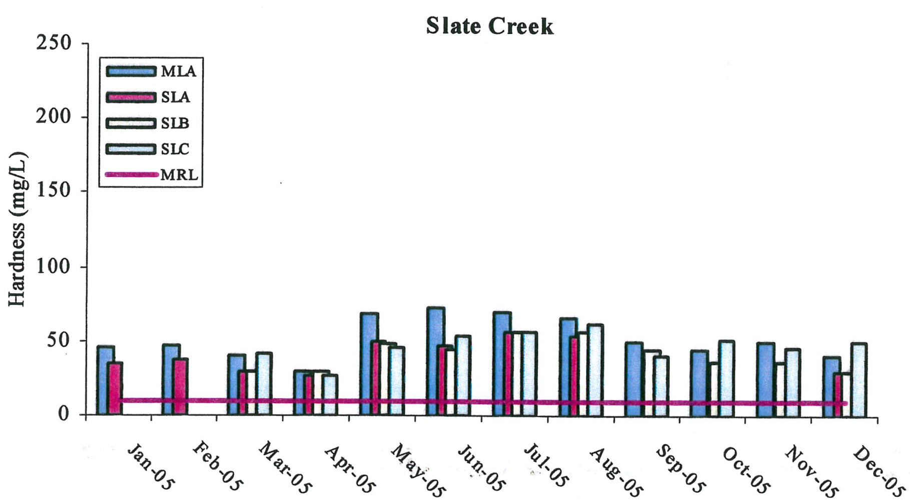
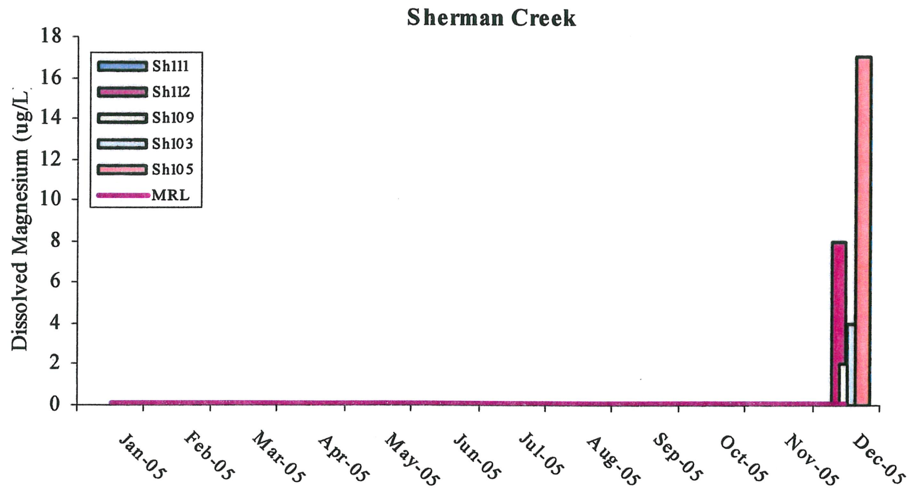
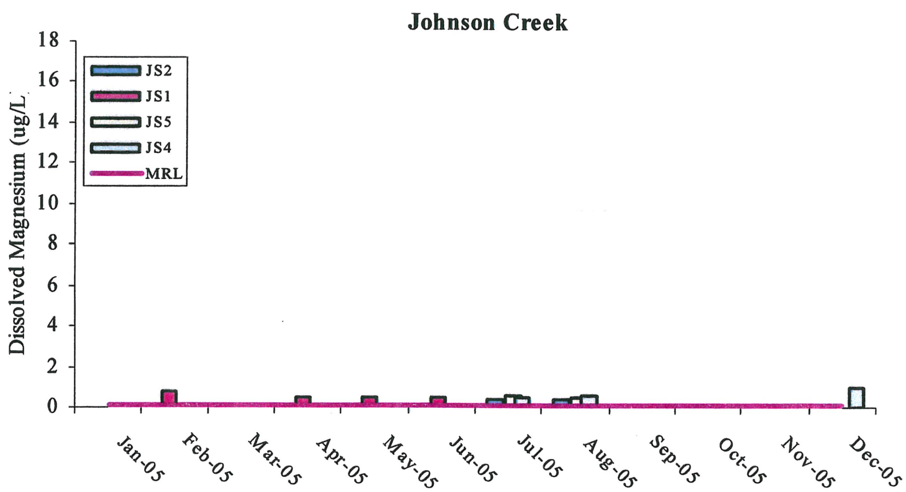


Figure 35. Dissolved Magnesium concentrations in Receiving Water, 2005





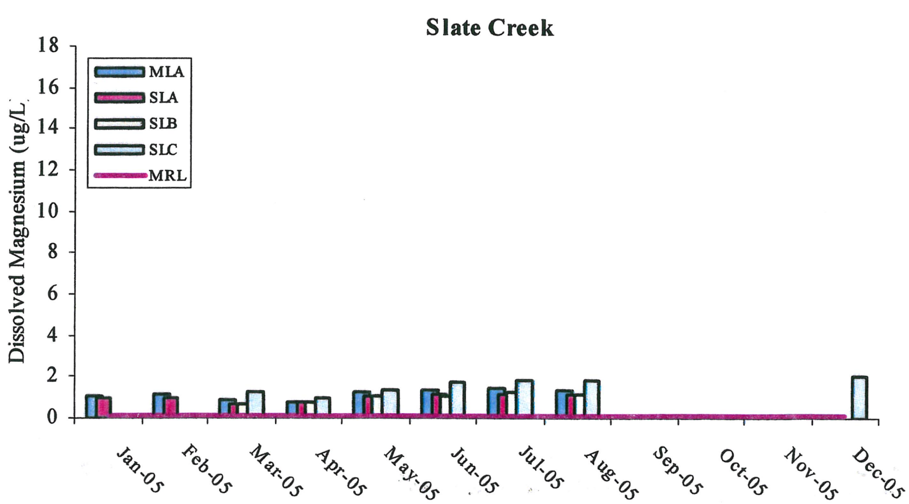


Figure 36. Dissolved Calcium concentrations in Receiving Water, 2005

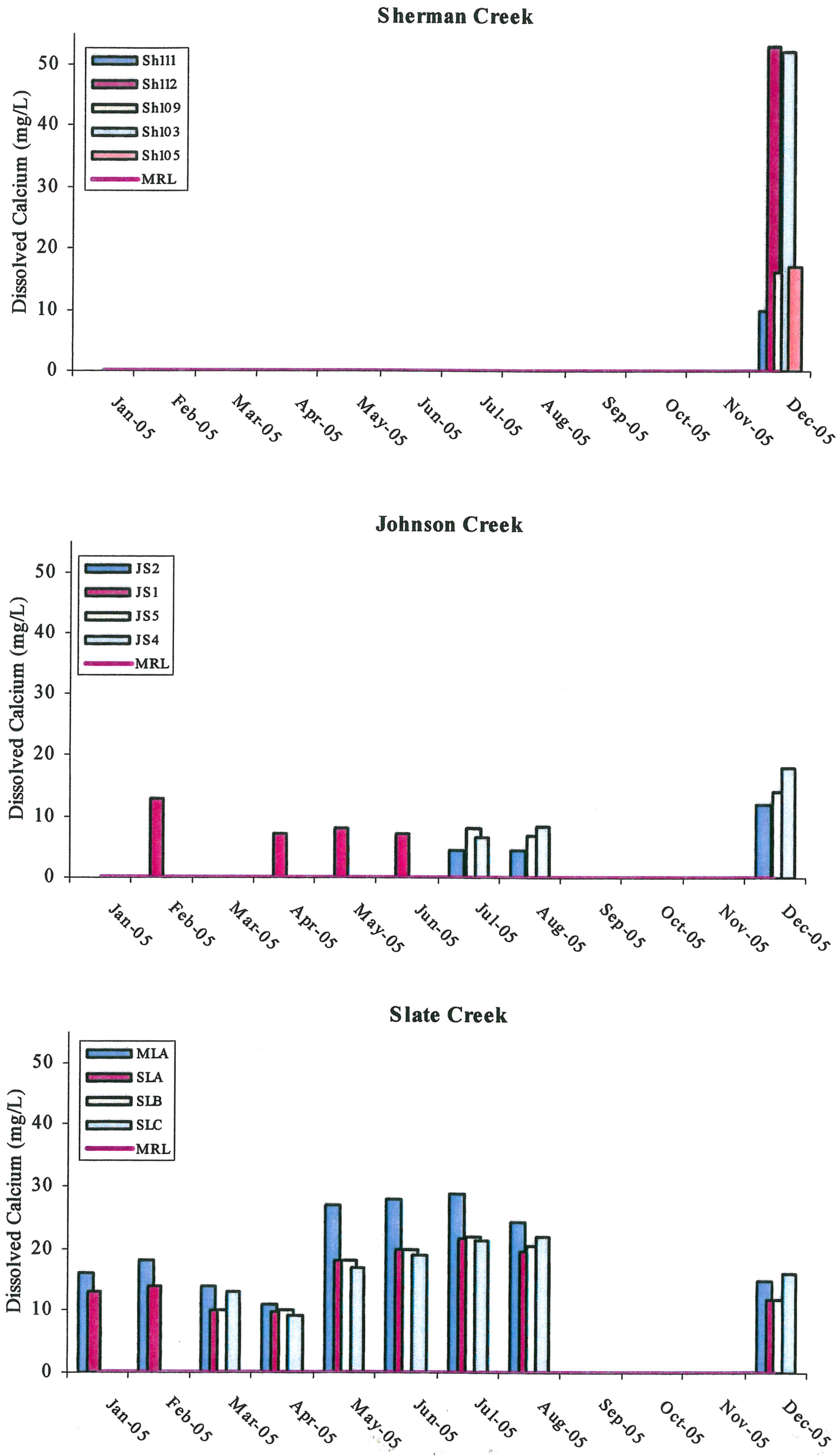


Figure 37. Water Temperature in Receiving Water, 2005

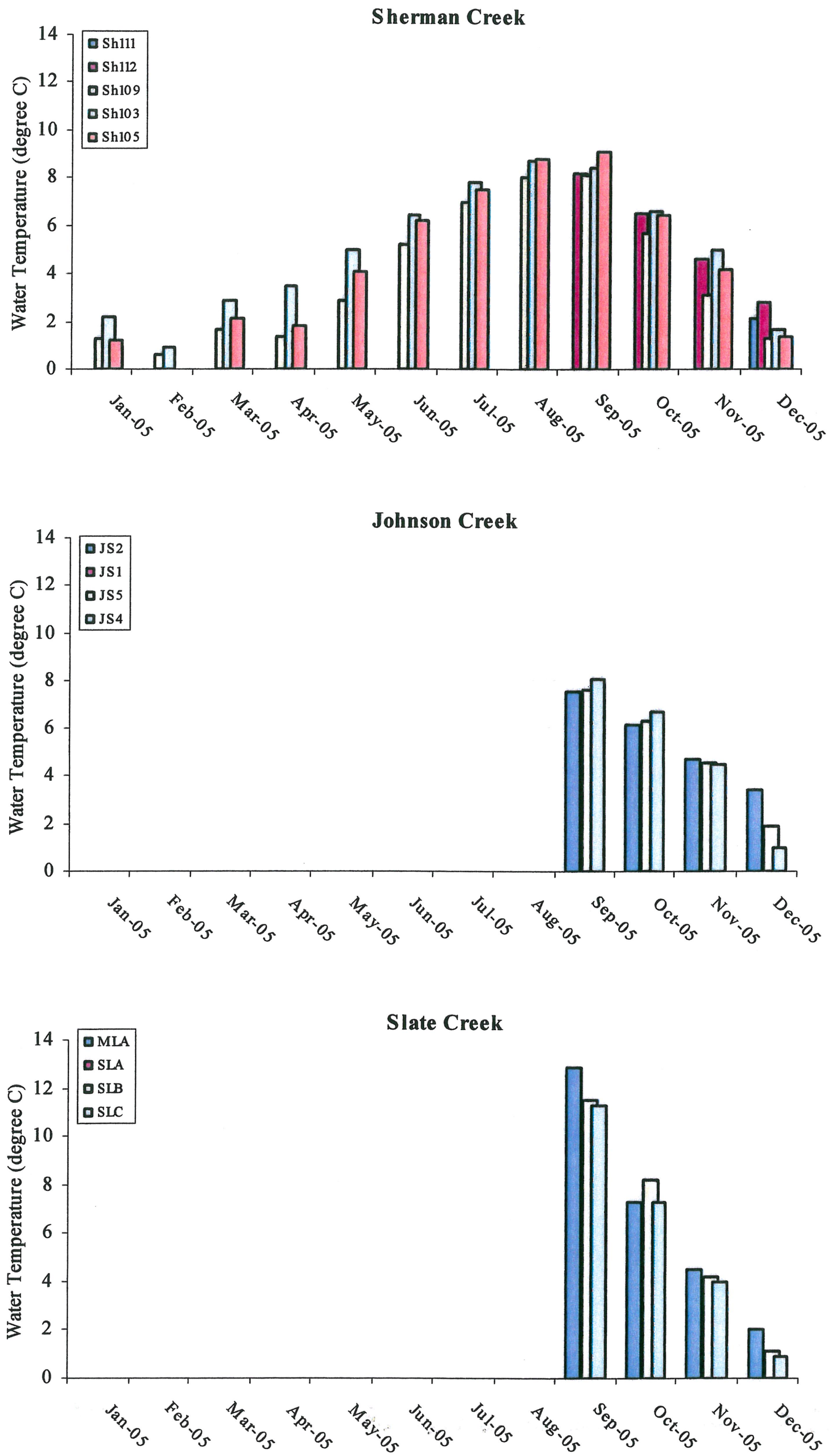
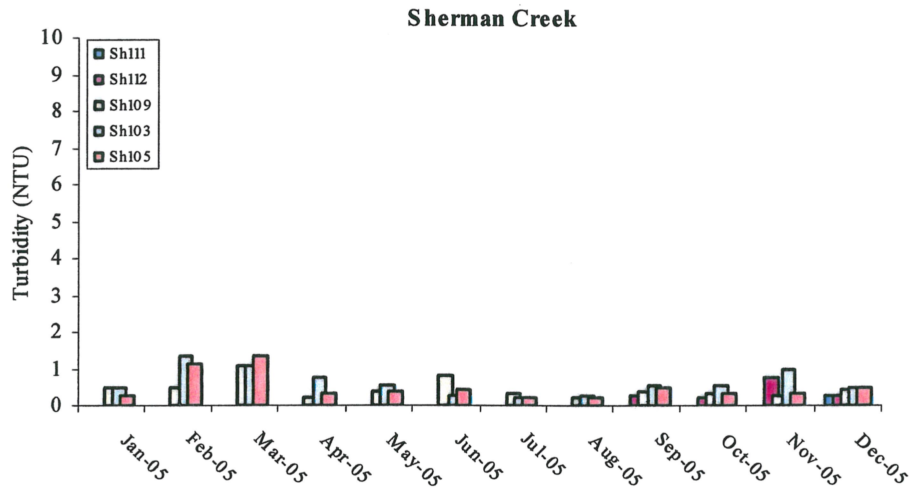
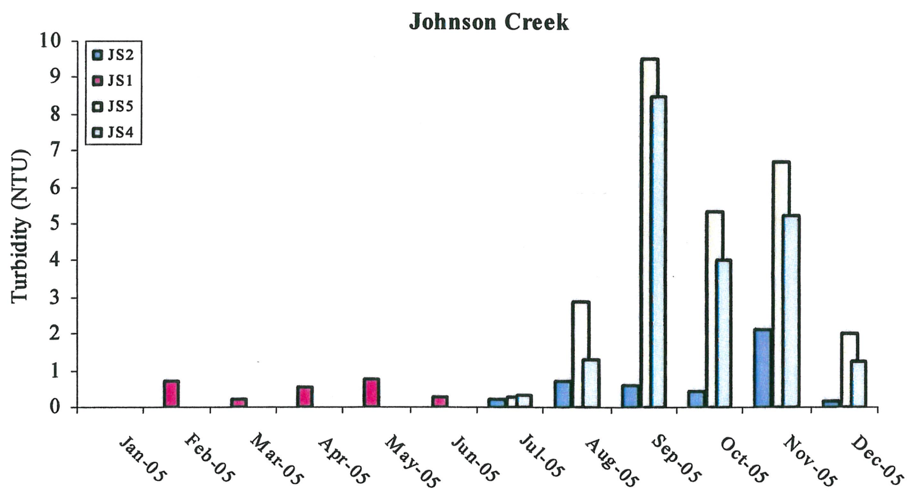


Figure 38. Turbidity in Receiving Water, 2005





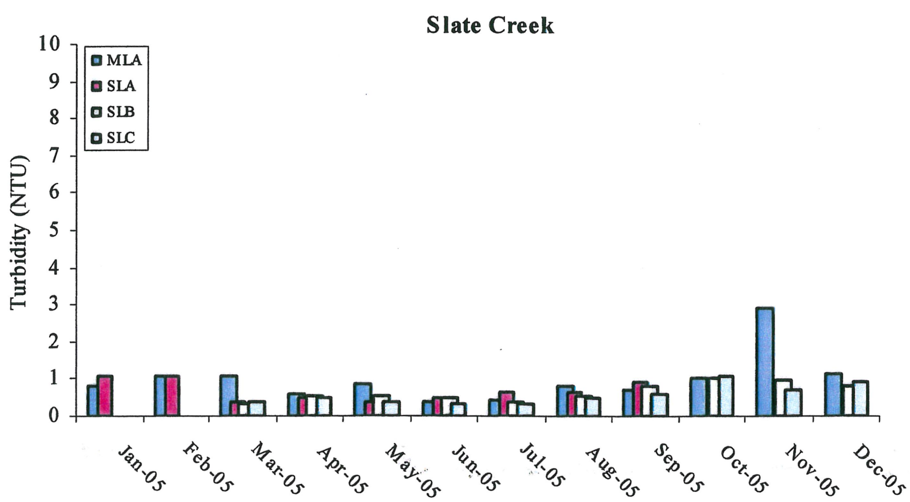
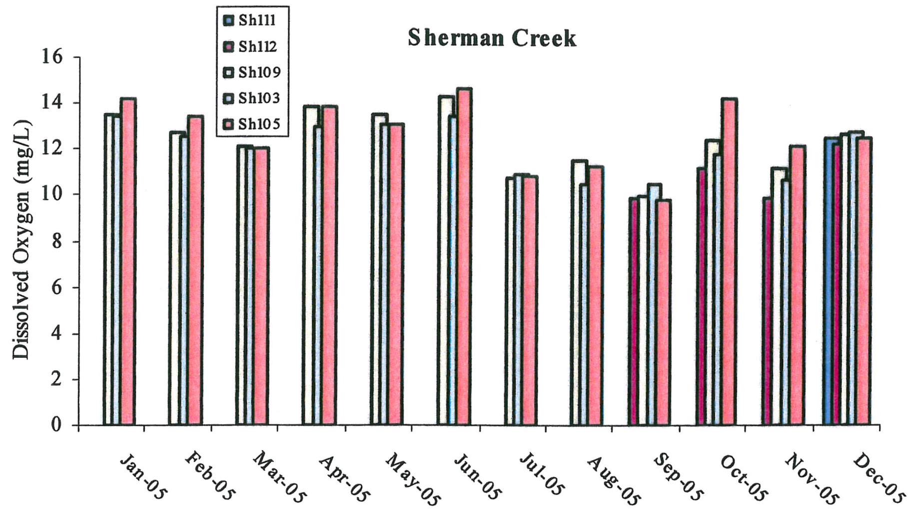
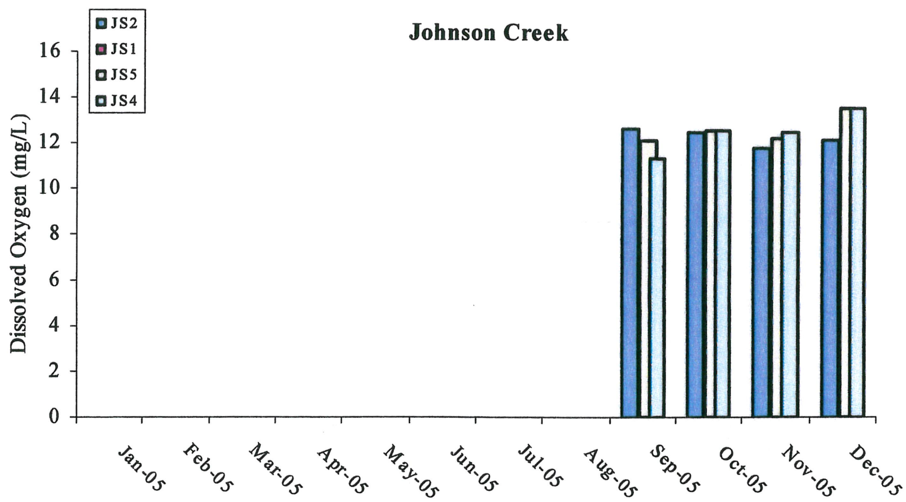


Figure 39. Dissolved Oxygen concentrations in Receiving Water, 2005





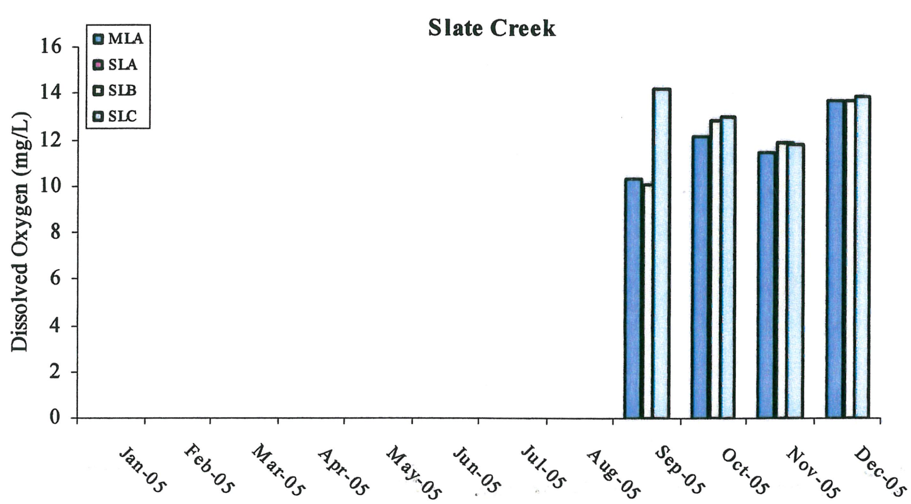


Figure 40. pH in Receiving Water, 2005

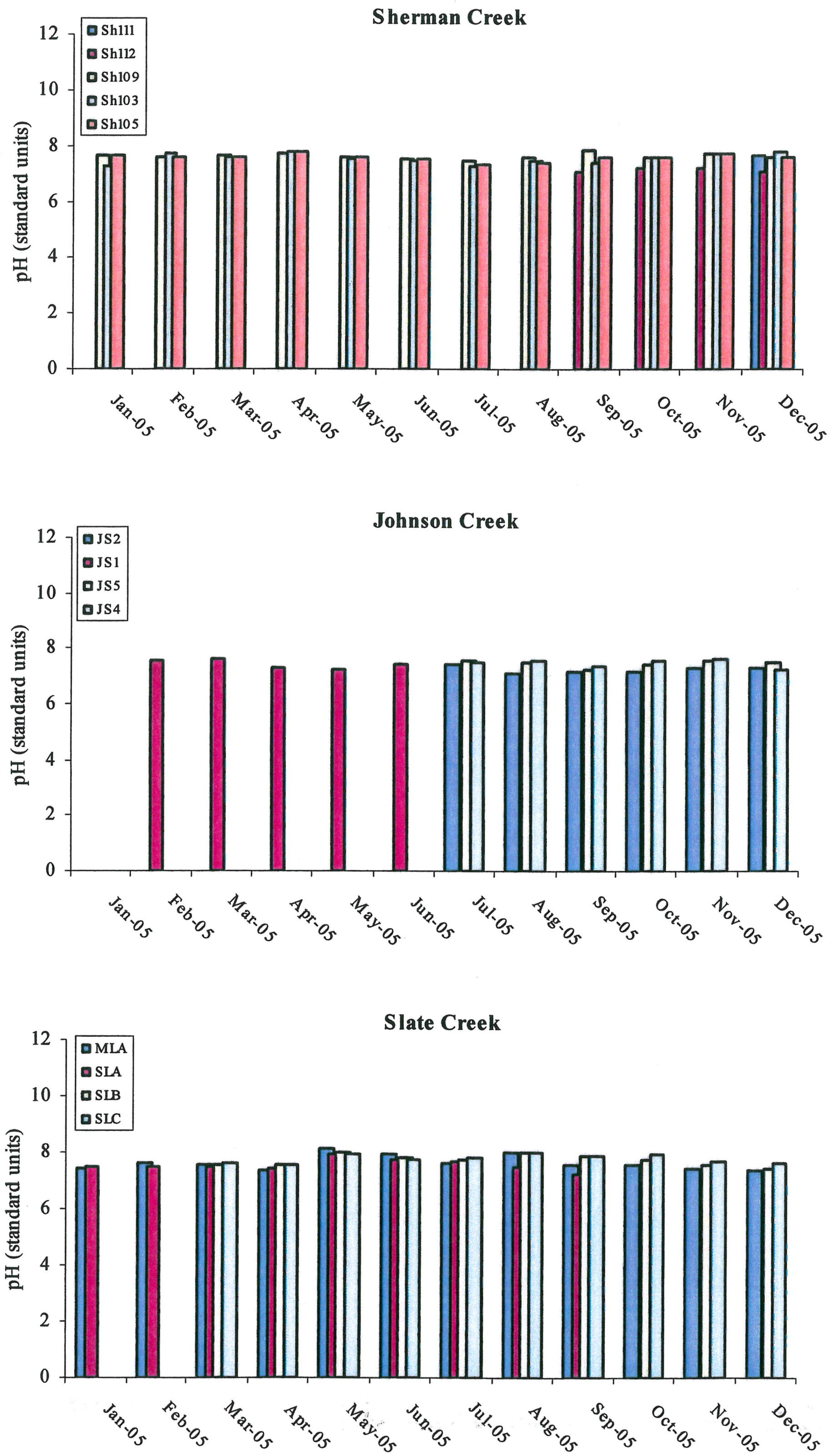
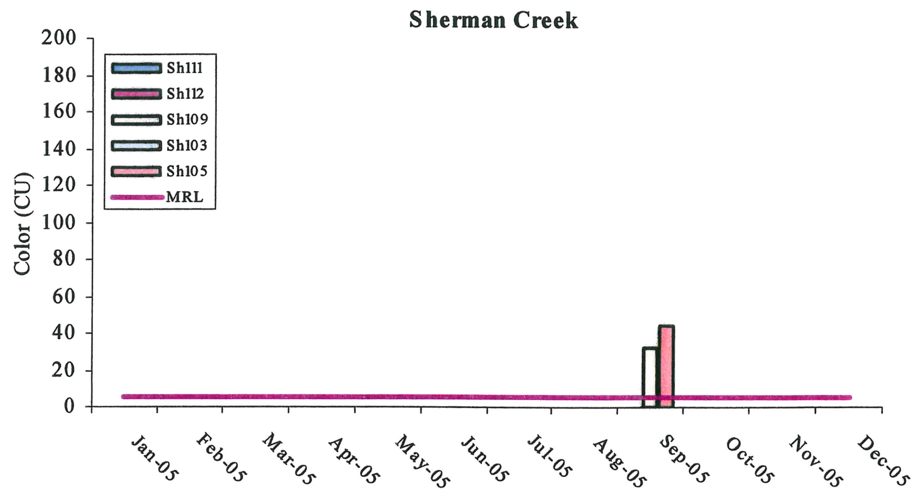
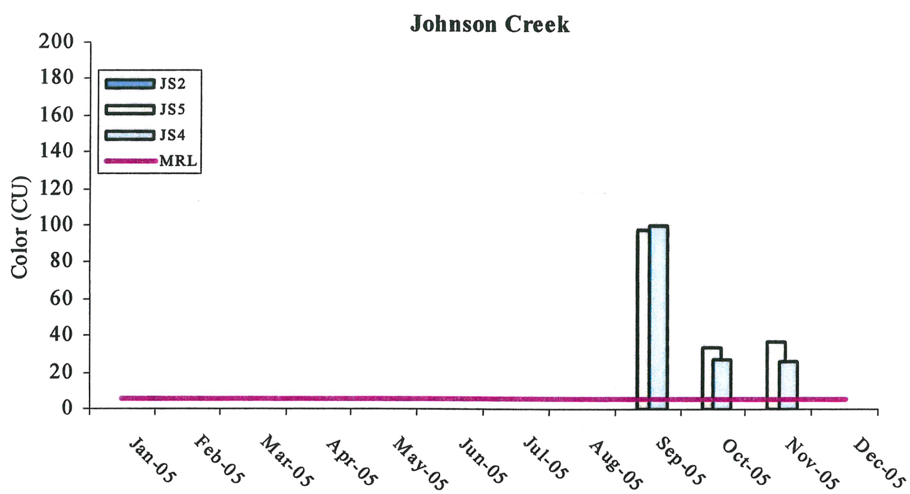


Figure 41. Color in Receiving Water, 2005





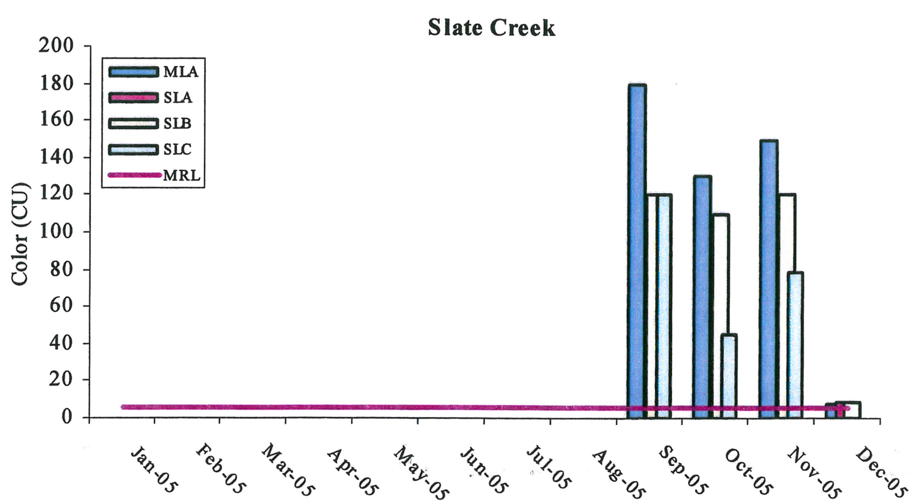
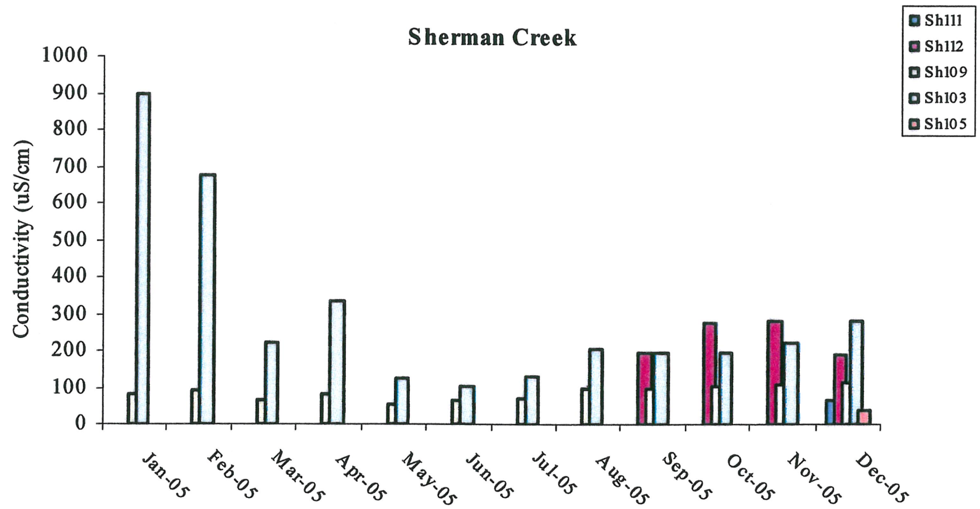
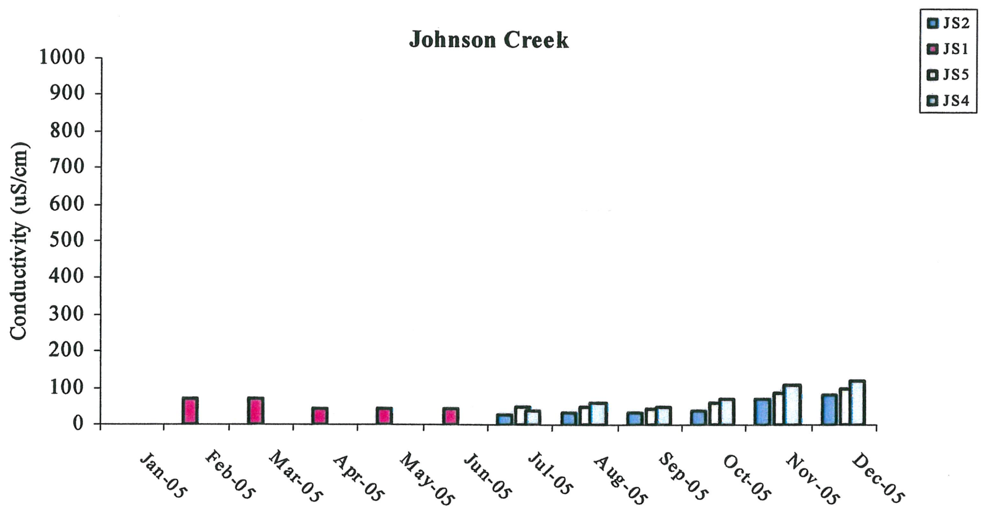


Figure 42. Conductivity in Receiving Water, 2005





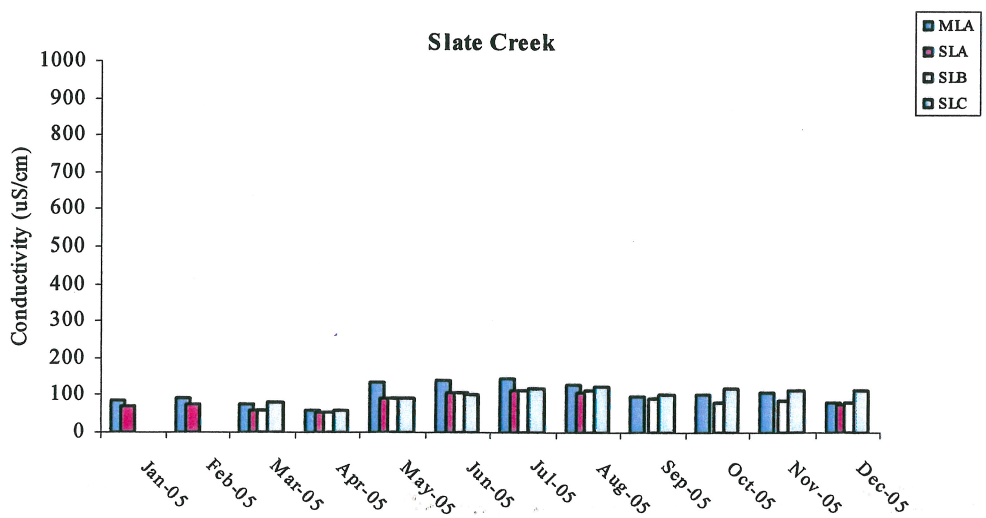
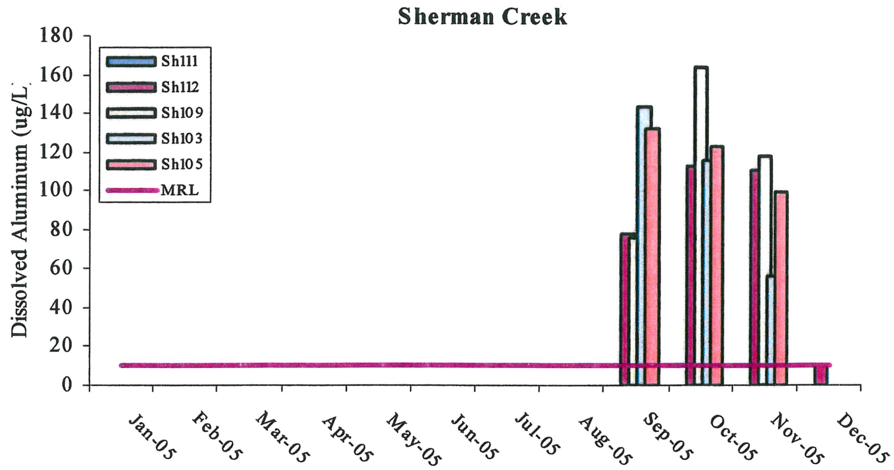
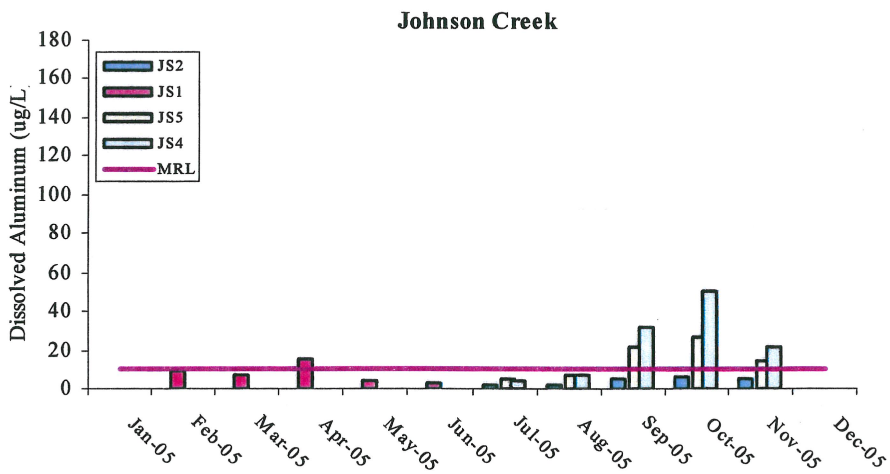


Figure 43. Dissolved Aluminum concentrations in Receiving Water, 2005





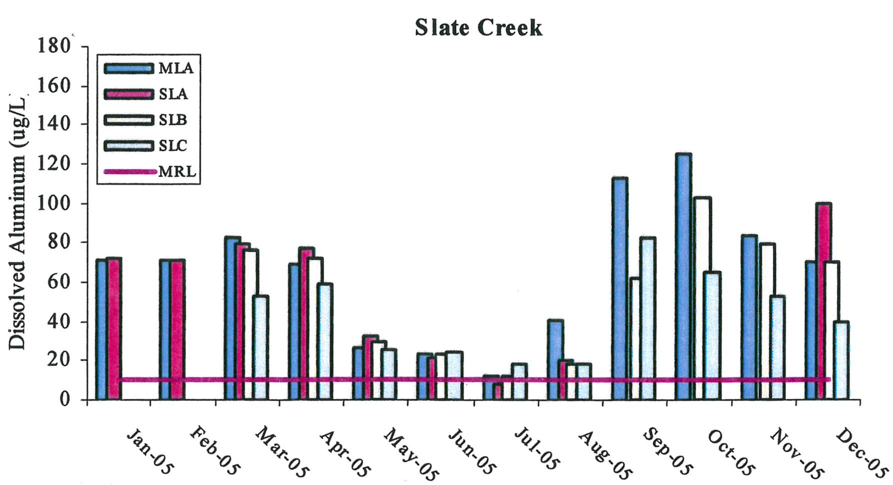
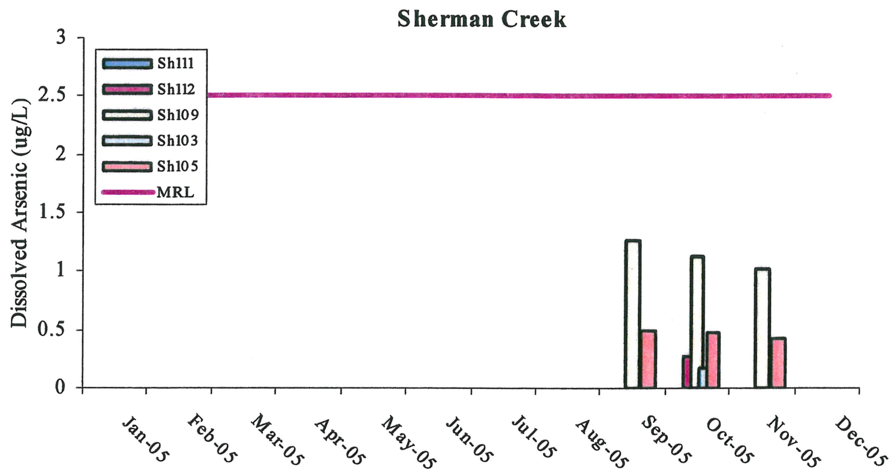
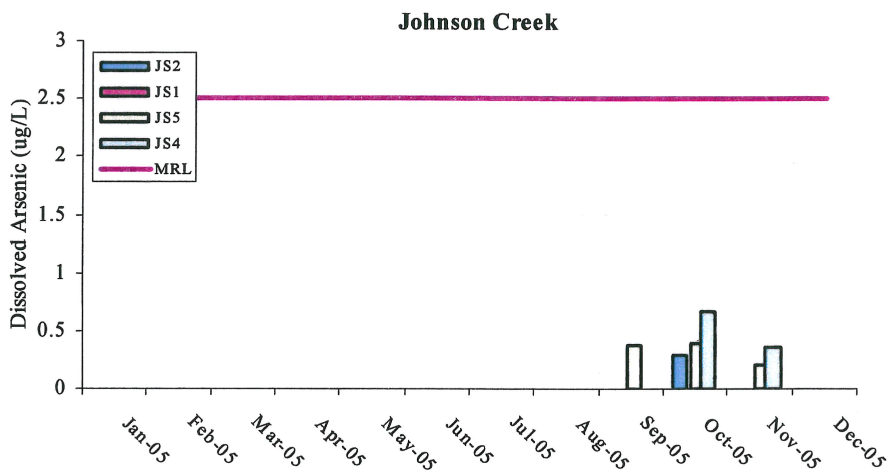


Figure 44. Dissolved Arsenic concentrations in Receiving Water, 2005





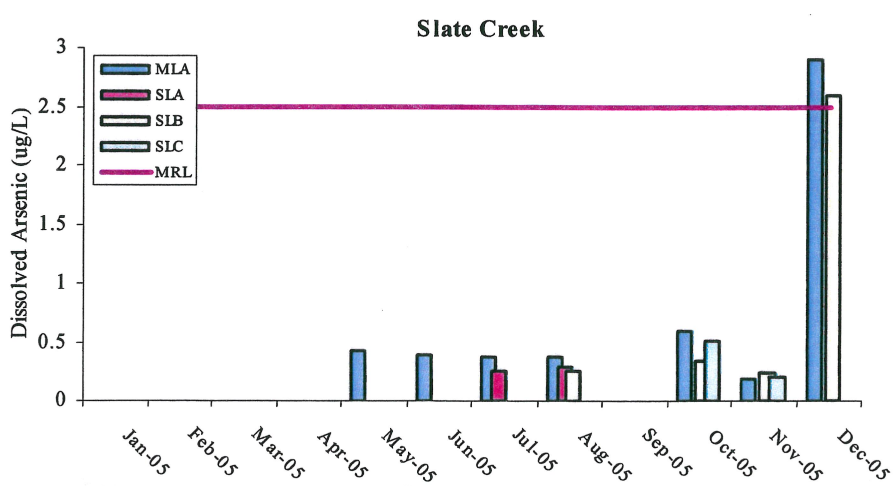


Figure 45. Dissolved Chromium concentrations in Receiving Water, 2005

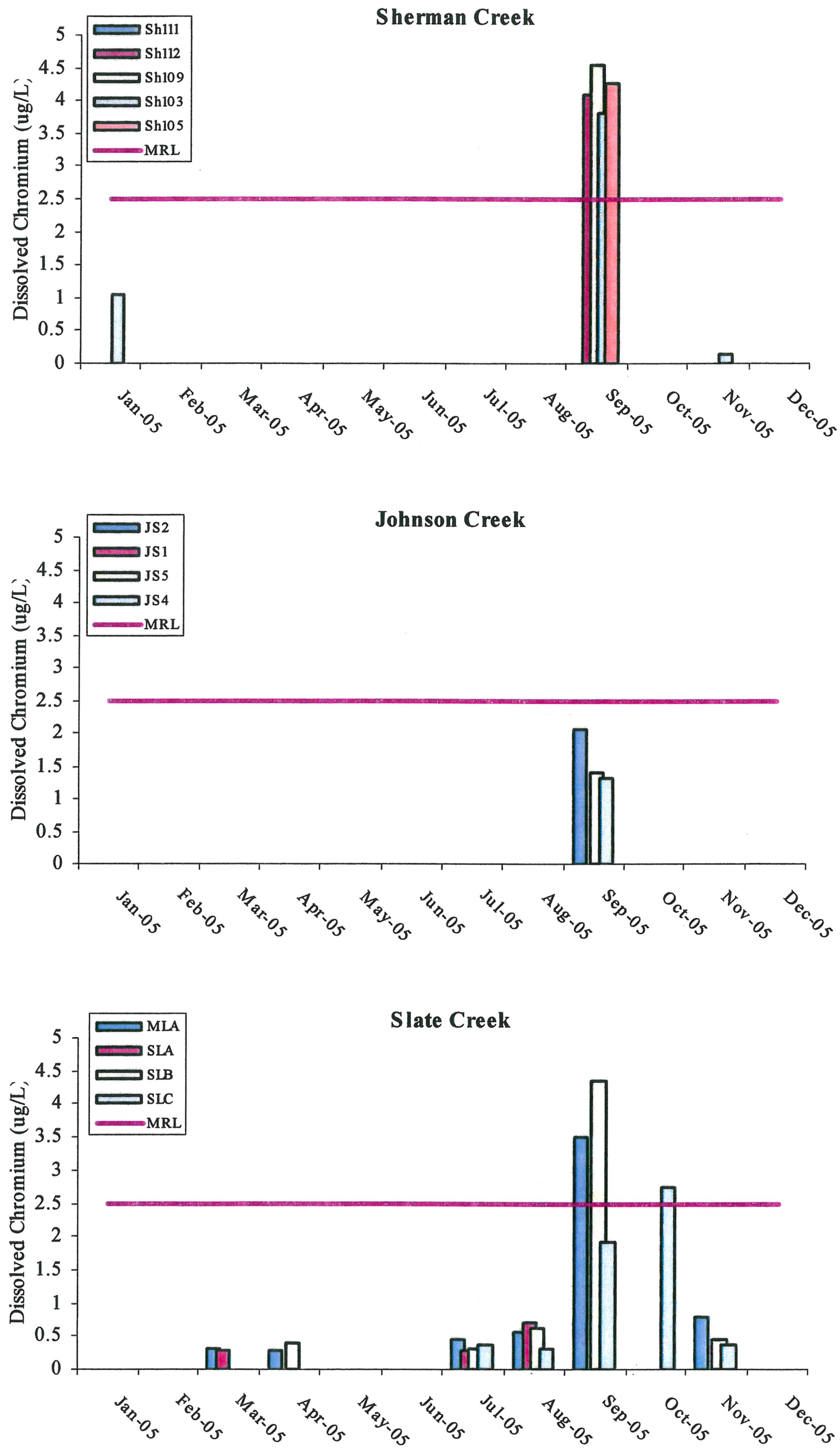
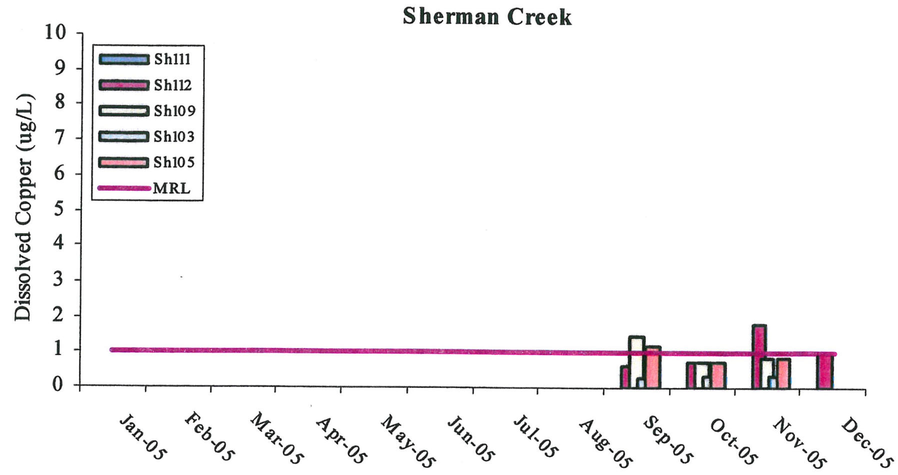
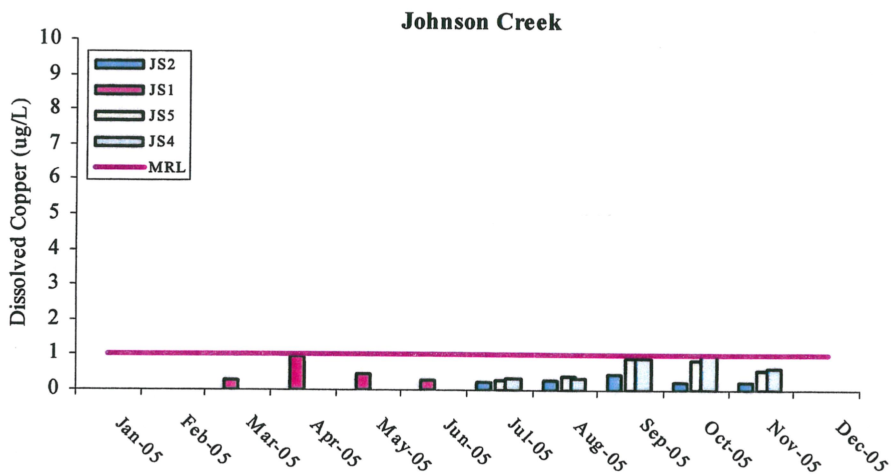


Figure 46. Dissolved Copper concentrations in Receiving Water, 2005





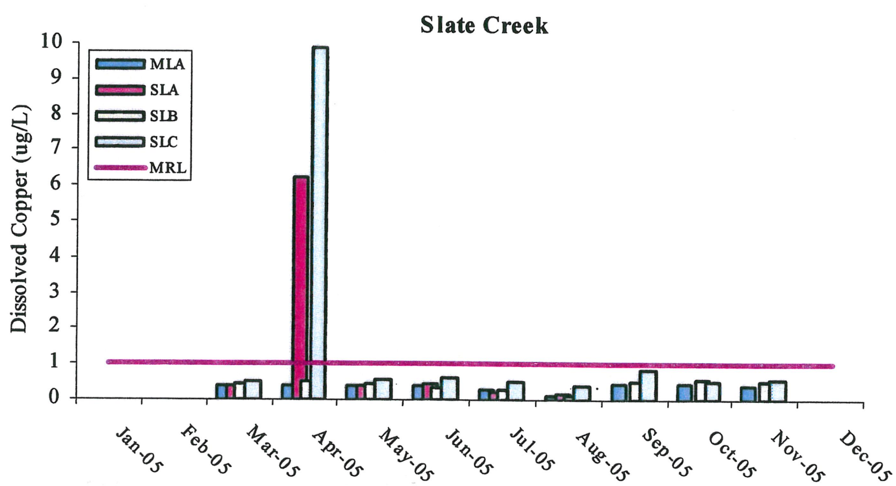


Figure 47. Dissolved Iron concentrations in Receiving Water, 2005

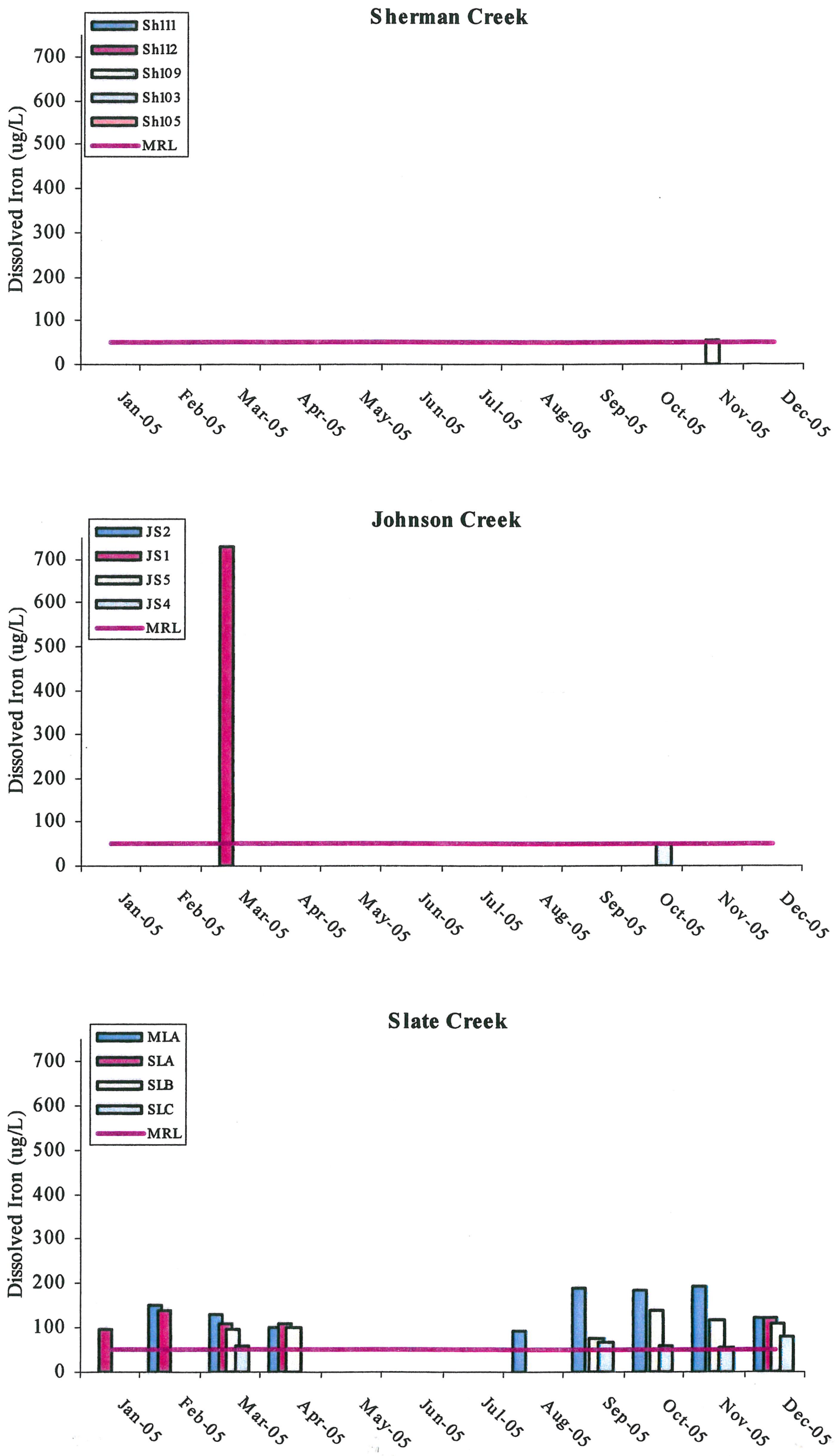
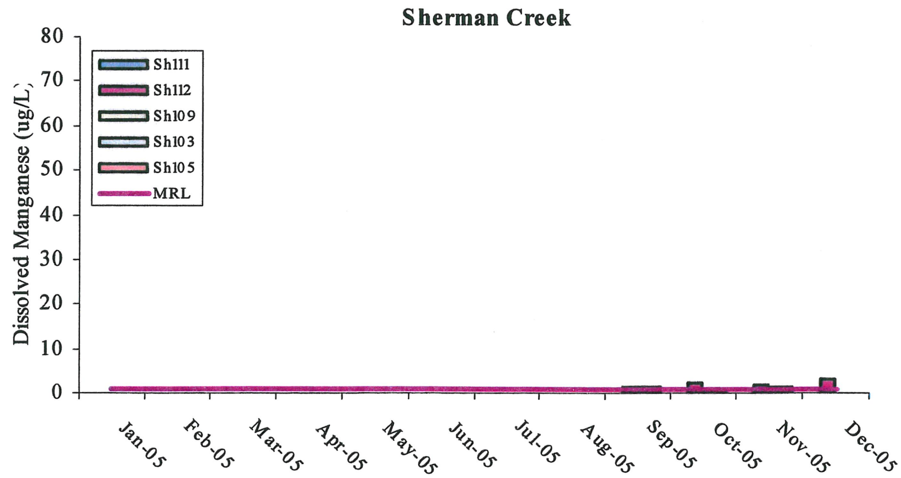
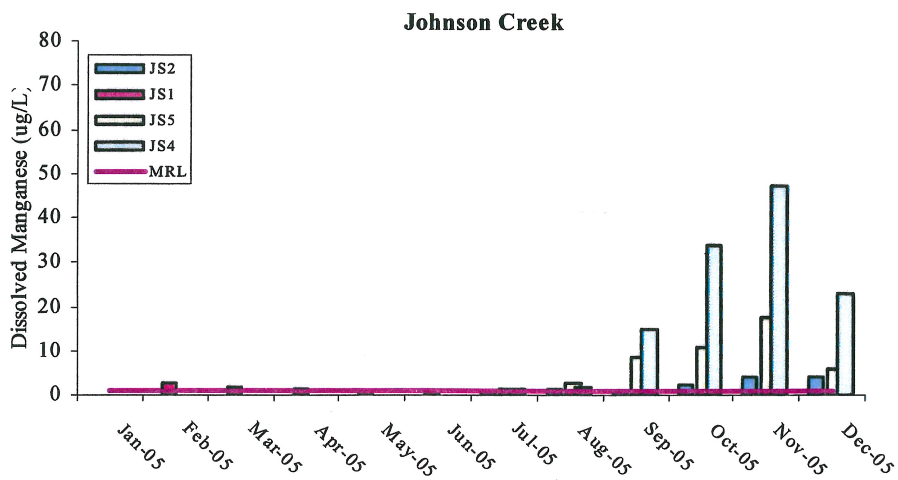


Figure 48. Dissolved Manganese concentrations in Receiving Water, 2005





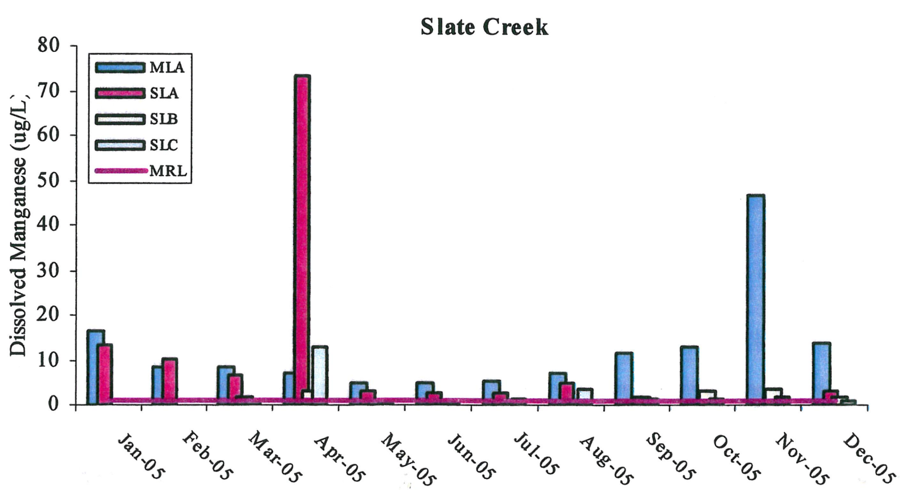


Figure 49. Dissolved Mercury concentrations in Receiving Water, 2005

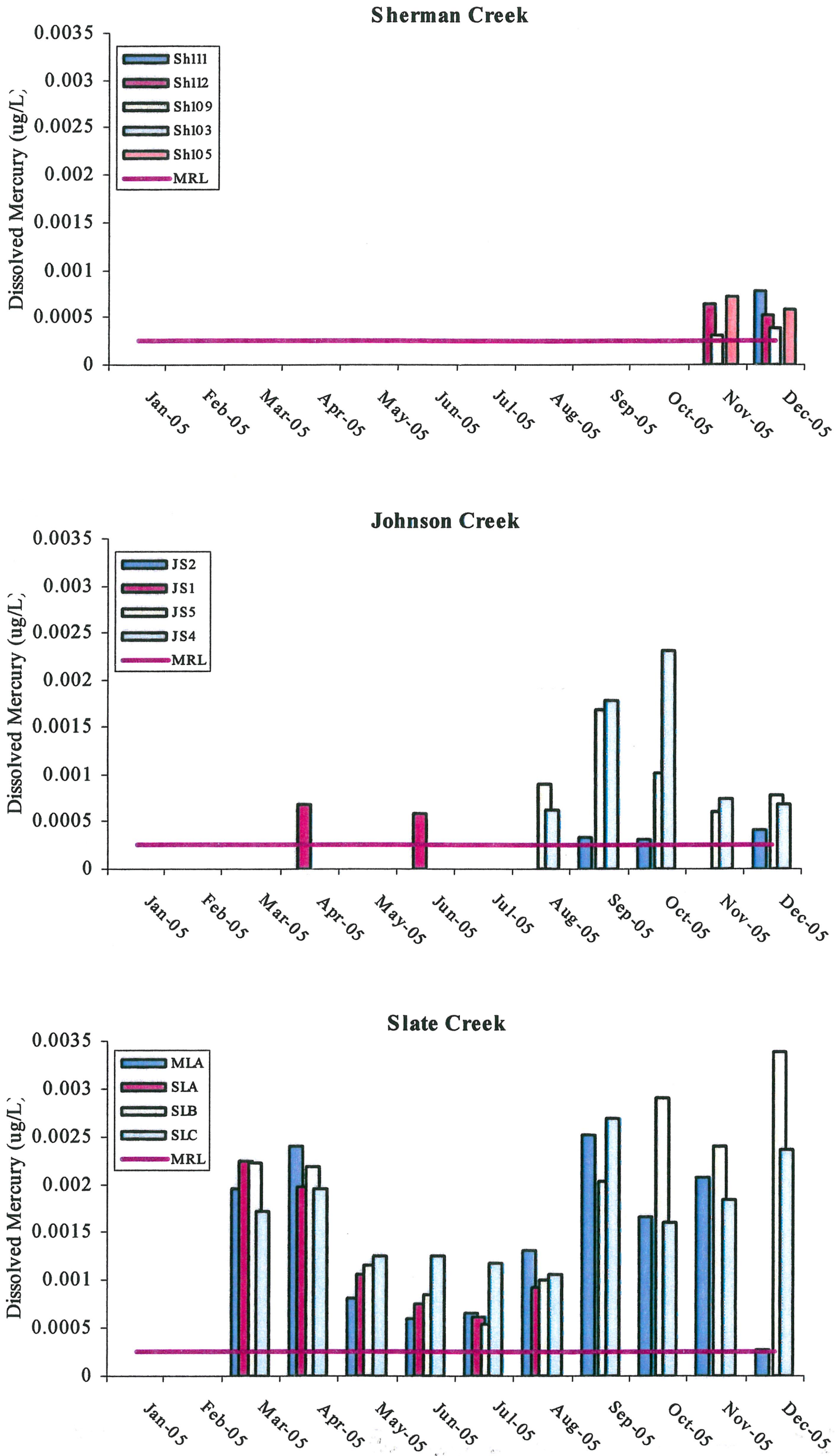
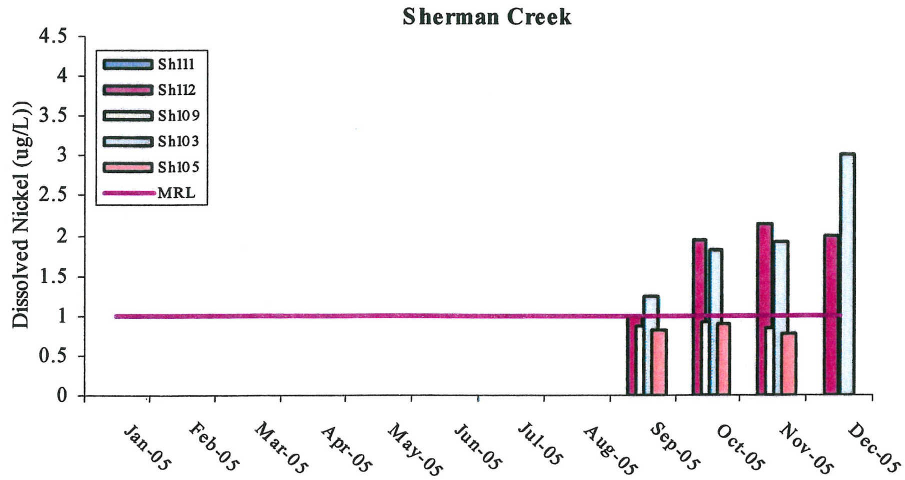
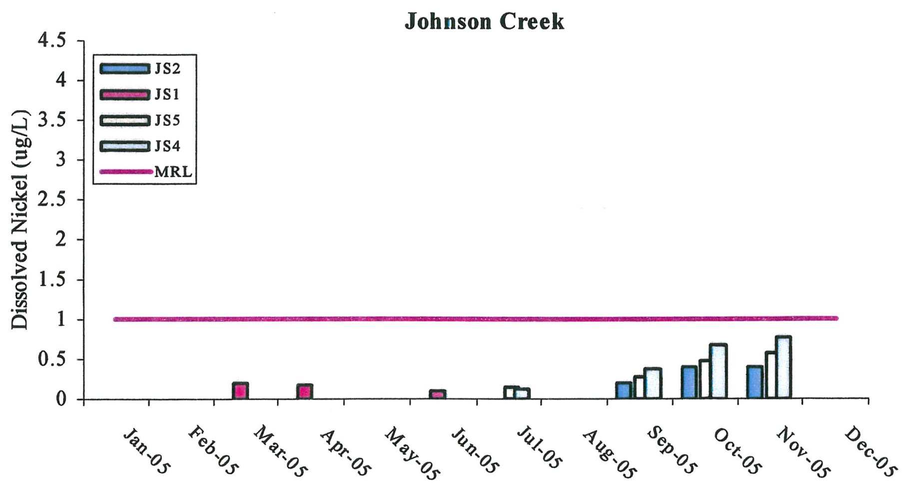


Figure 50. Dissolved Nickel concentrations in Receiving Water, 2005





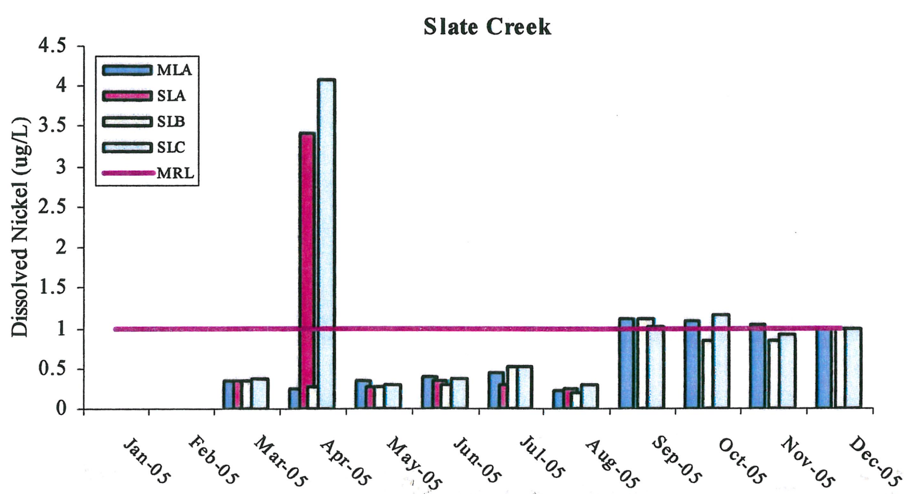


Figure 51. Dissolved Selenium concentrations in Receiving Water, 2005

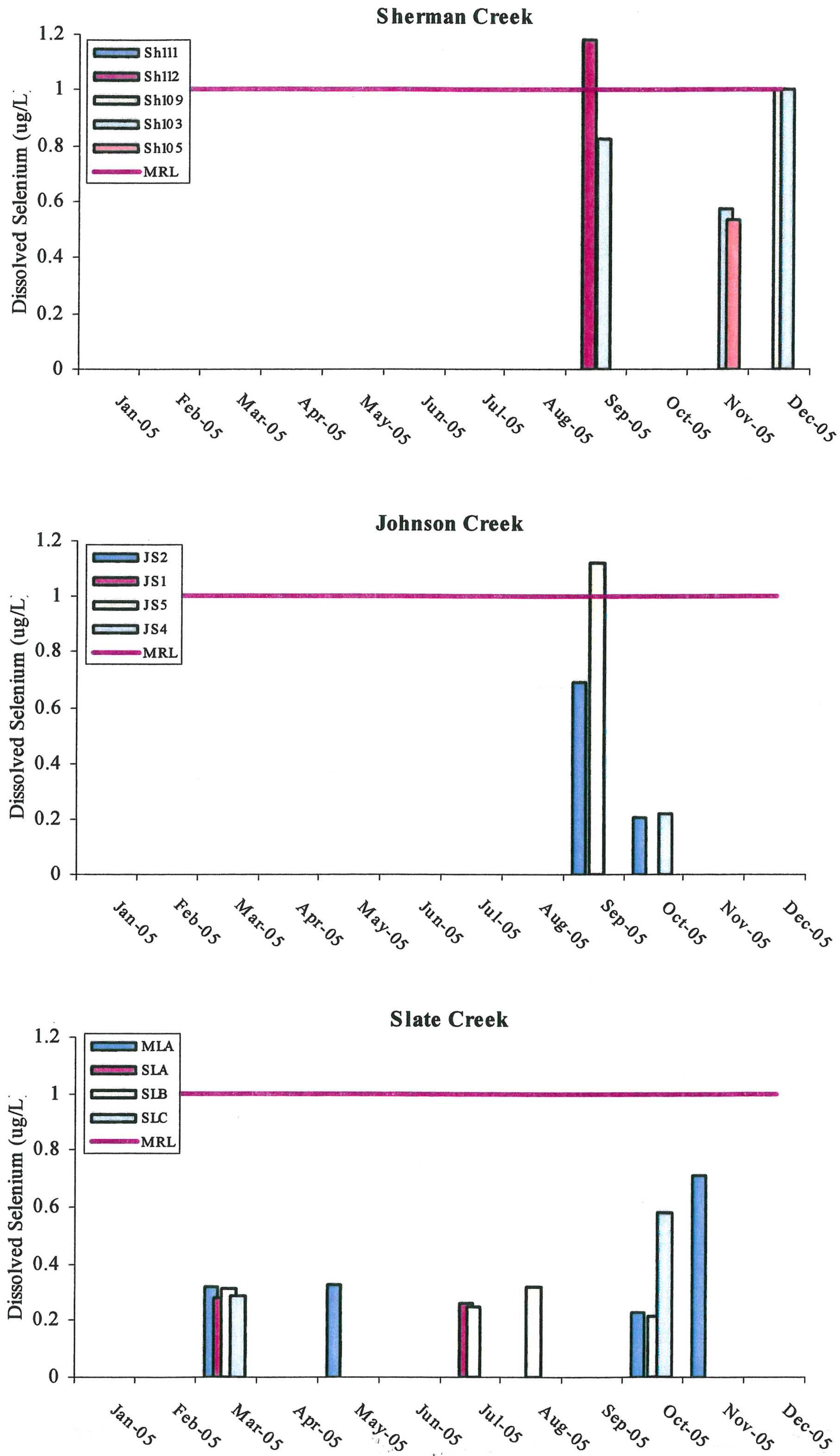
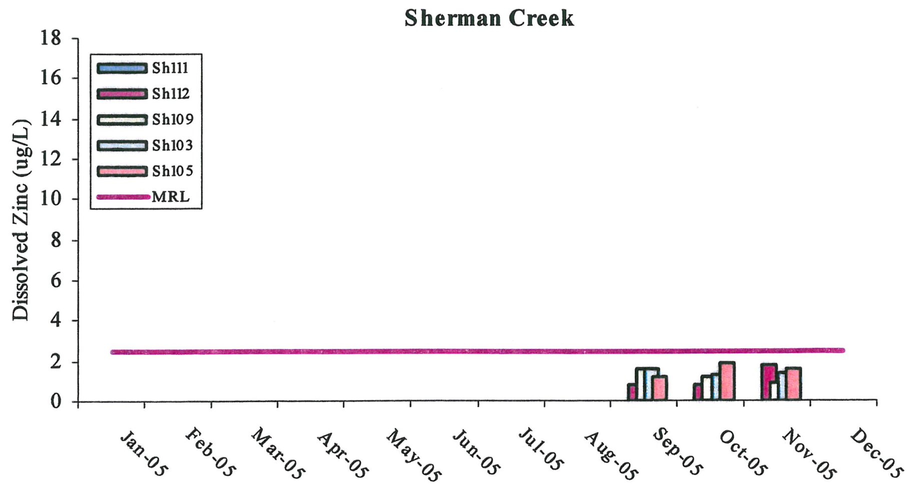
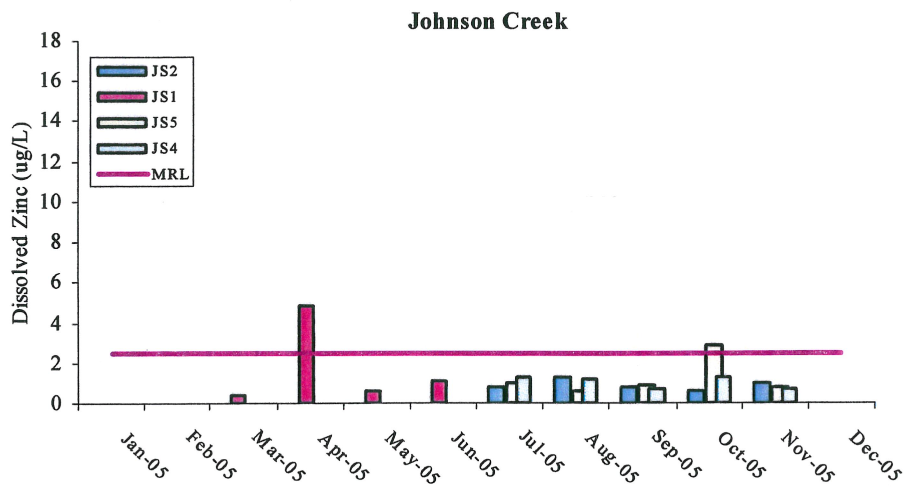


Figure 52. Dissolved Zinc concentrations in Receiving Water, 2005





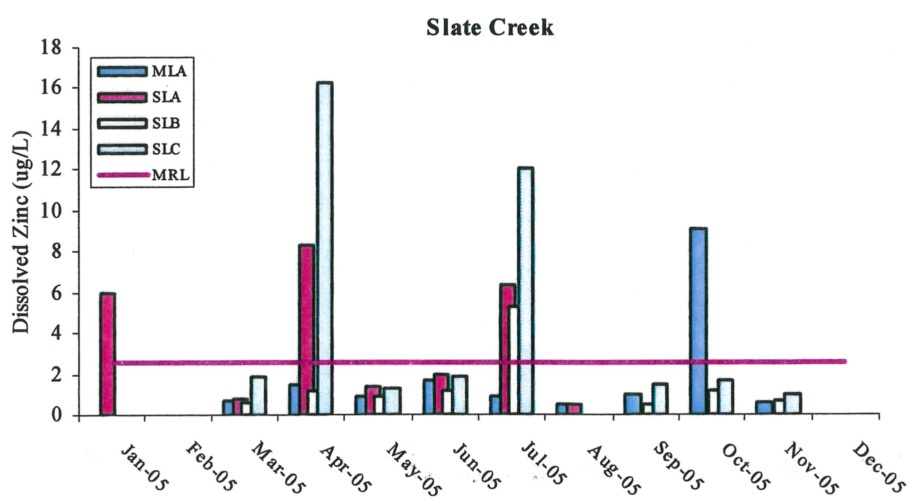
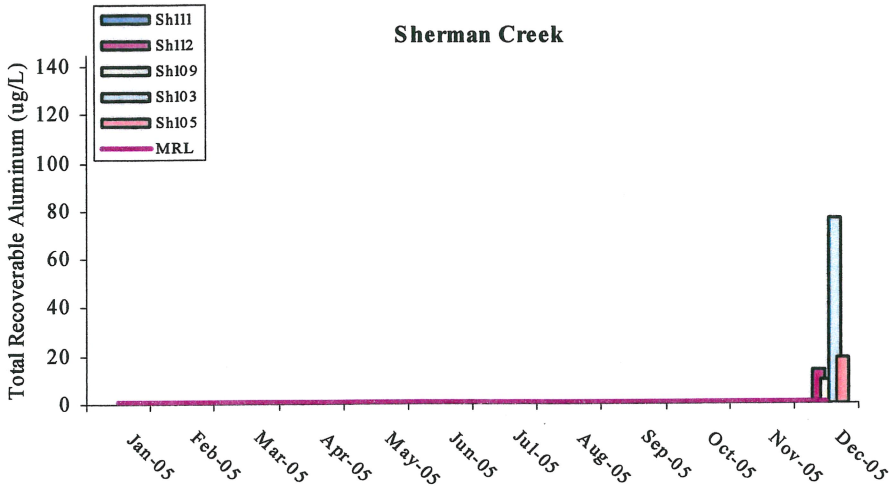
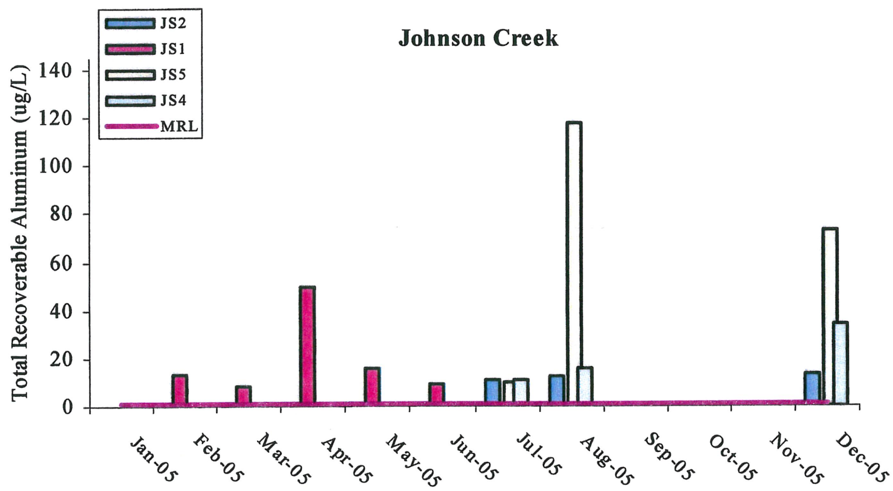


Figure 53. Total Recoverable Aluminum concentrations in Receiving Water, 2005





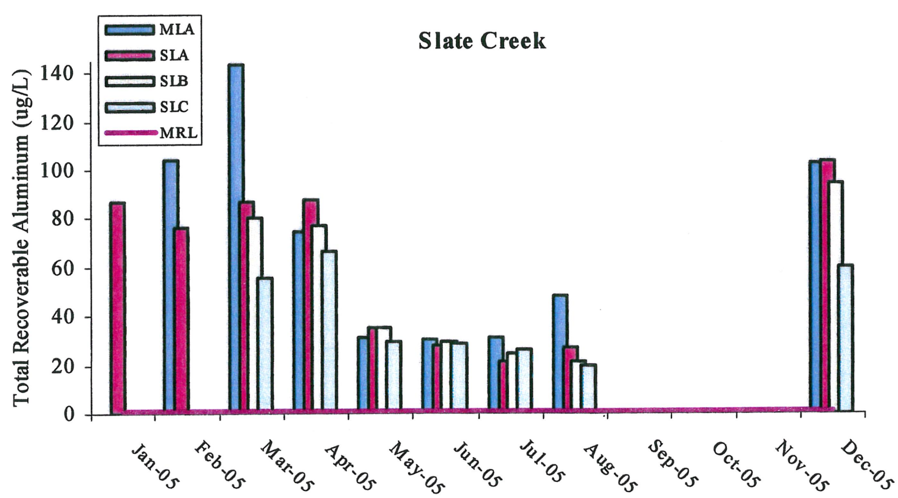
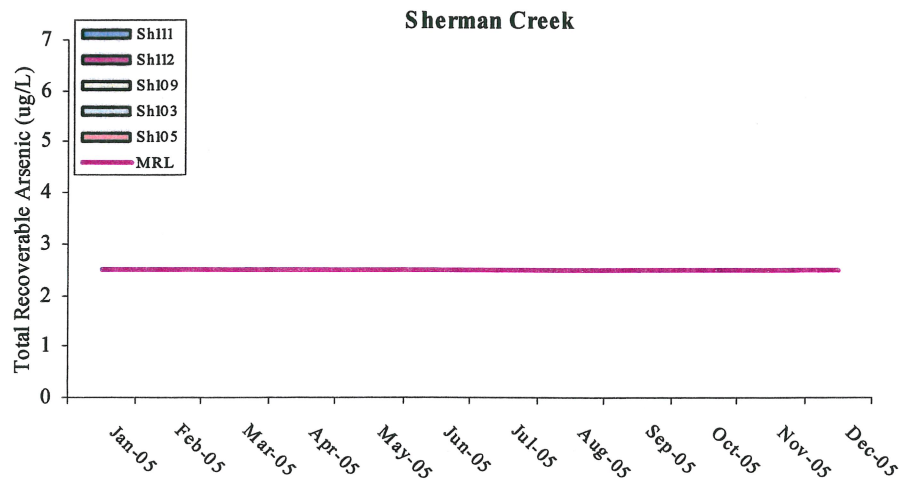
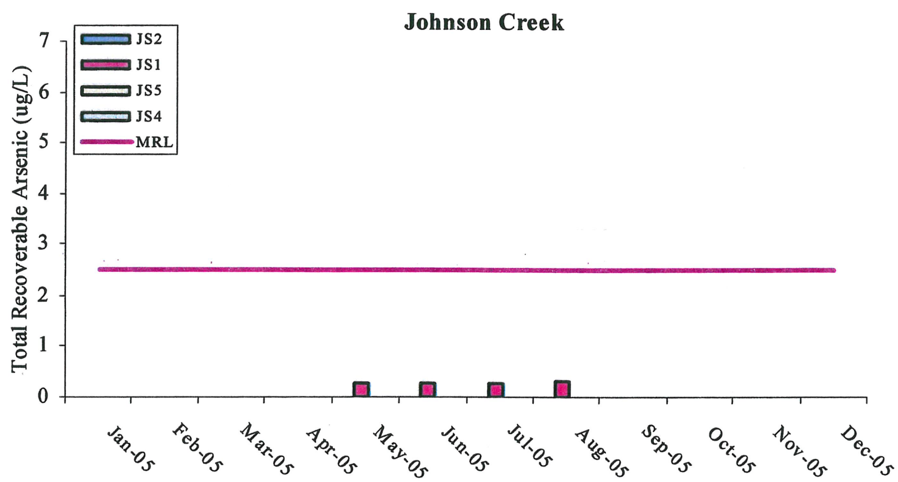


Figure 54. Total Recoverable Arsenic concentrations in Receiving Water, 2005





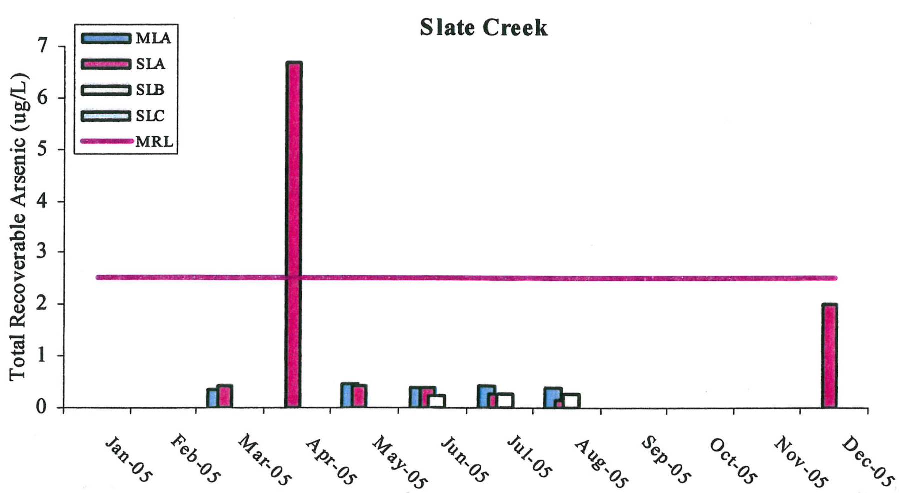
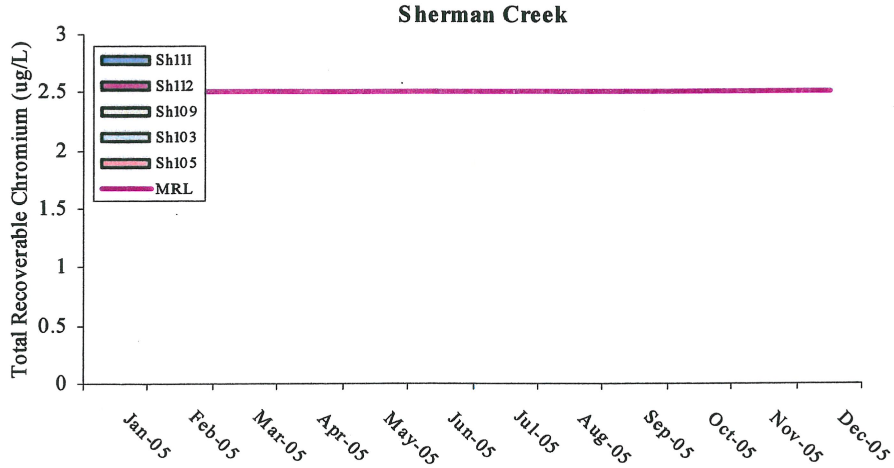
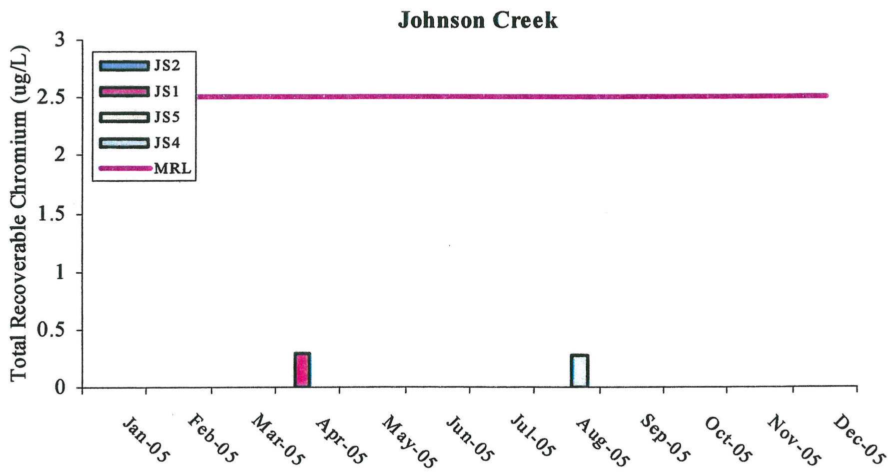


Figure 55. Total Recoverable Chromium concentrations in Receiving Water, 2005





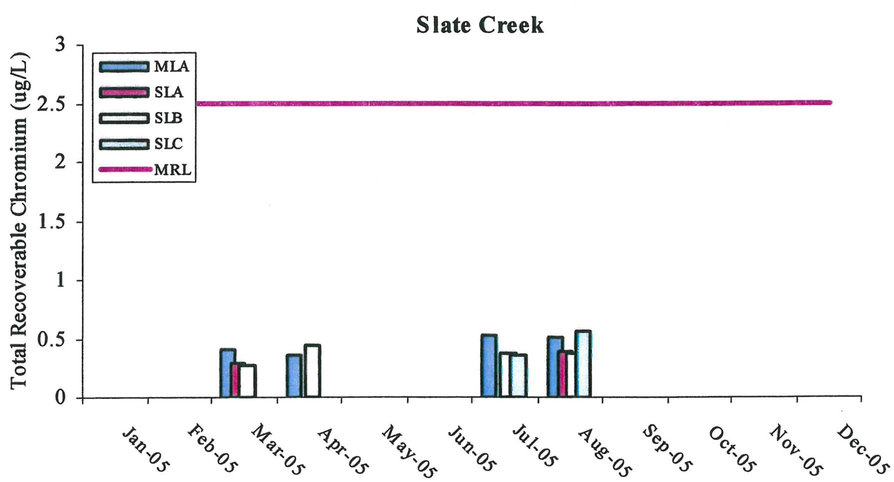
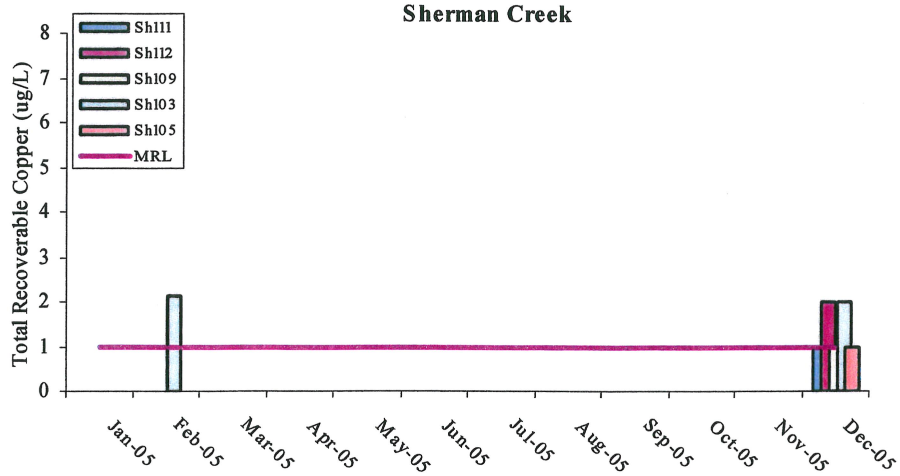
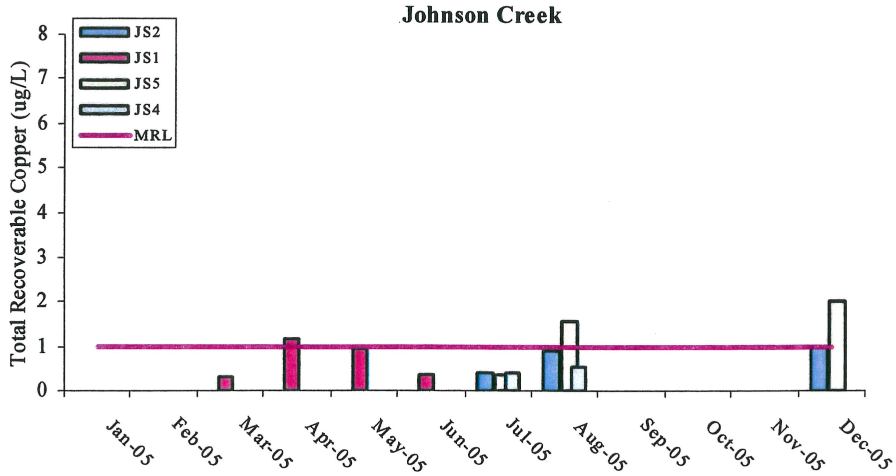


Figure 56. Total Recoverable Copper concentrations in Receiving Water, 2005





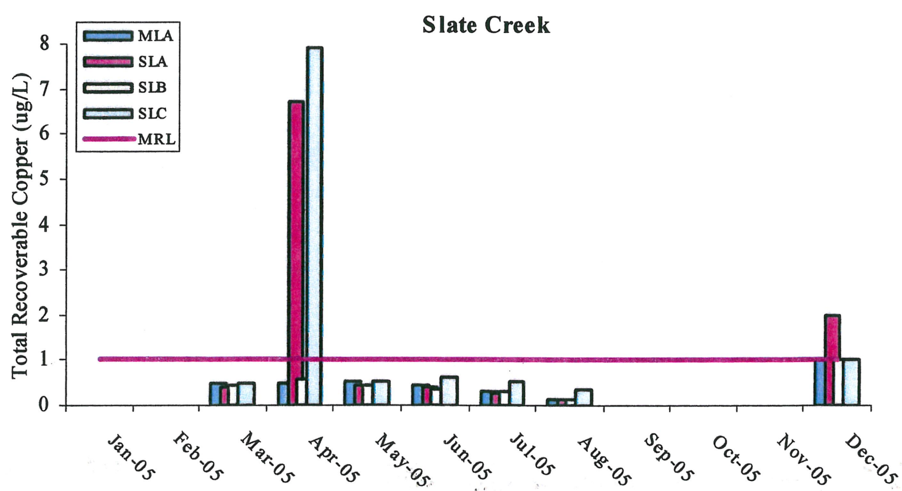
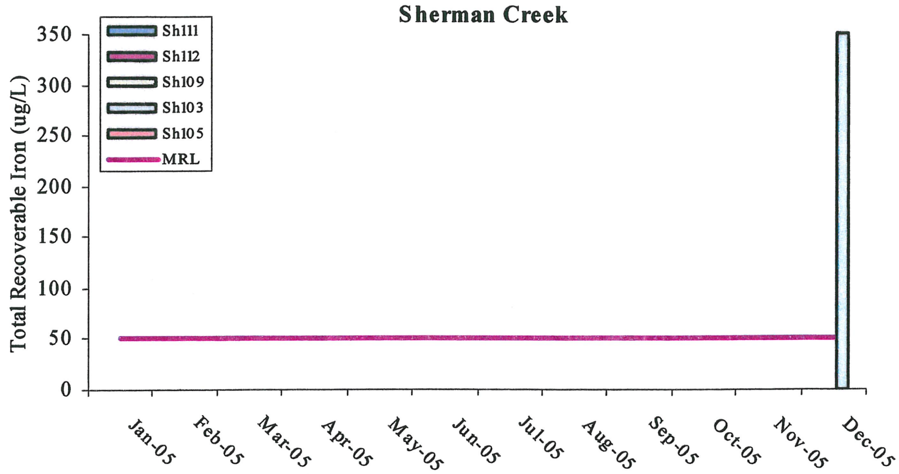
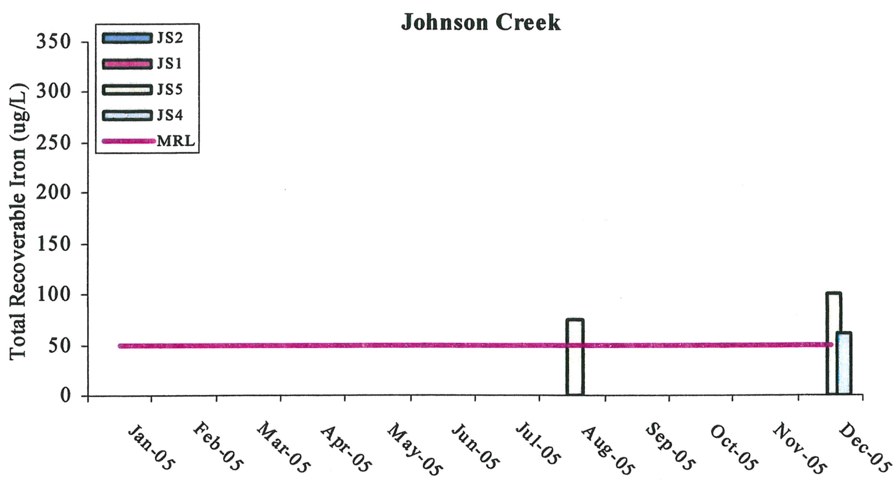


Figure 57. Total Recoverable Iron concentrations in Receiving Water, 2005





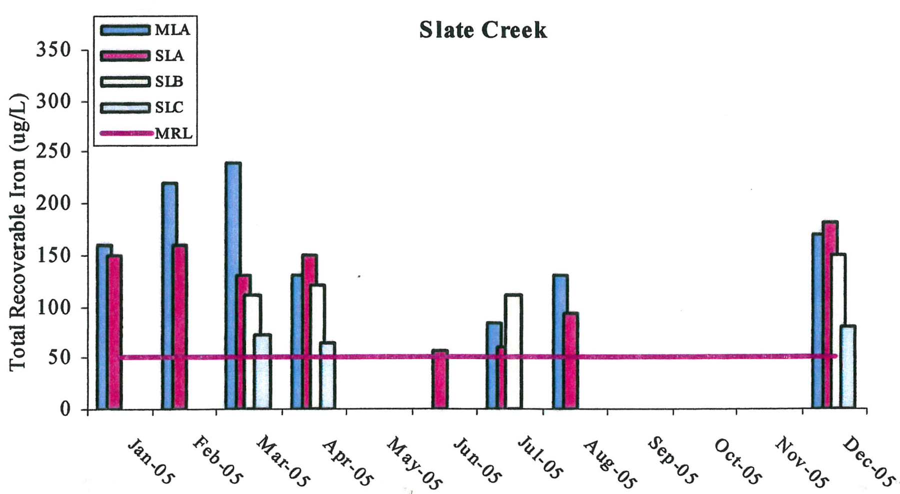


Figure 58. Total Recoverable Mercury concentrations in Receiving Water, 2005

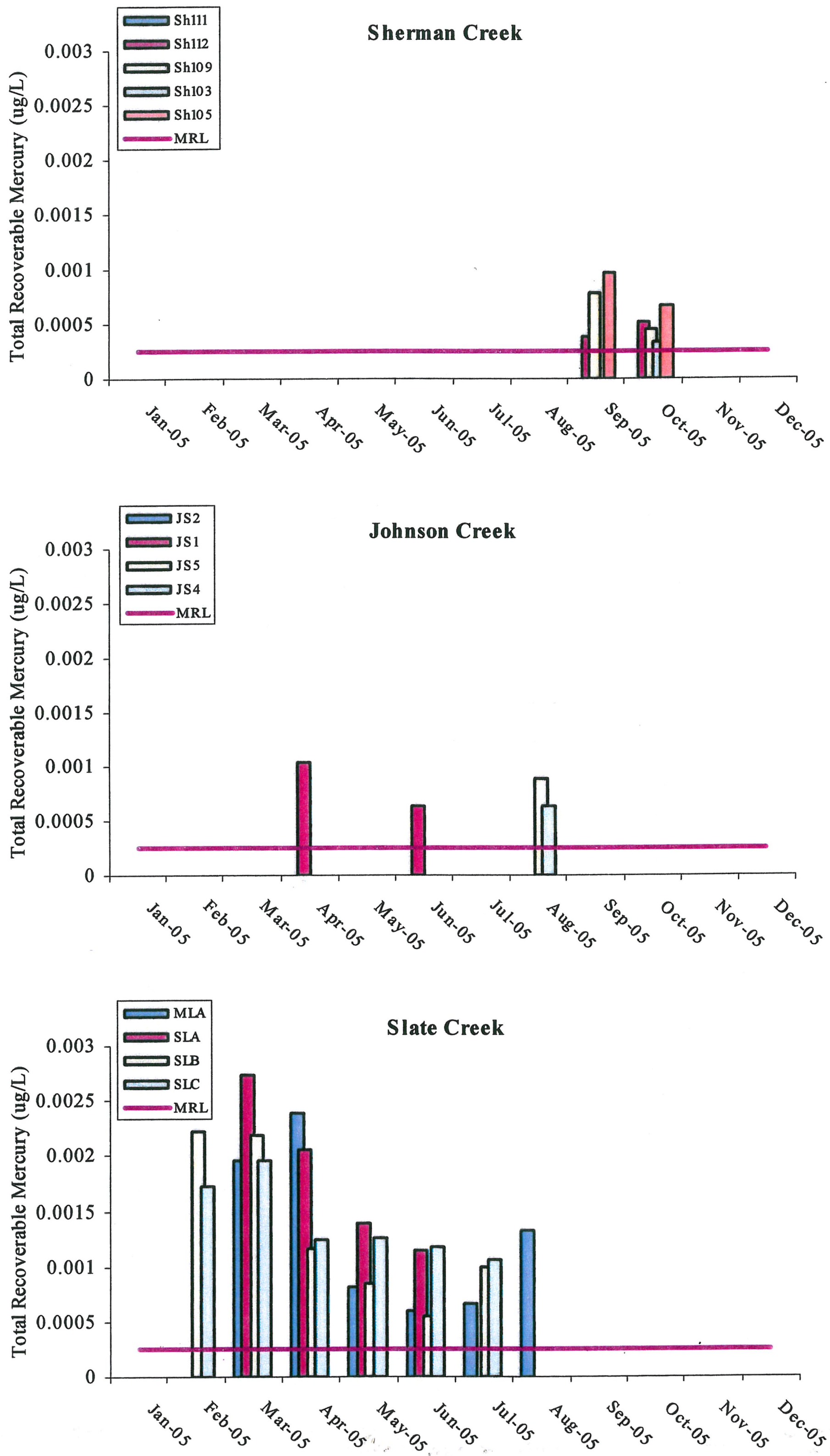


Figure 59. Total Recoverable Nickel concentrations in Receiving Water, 2005

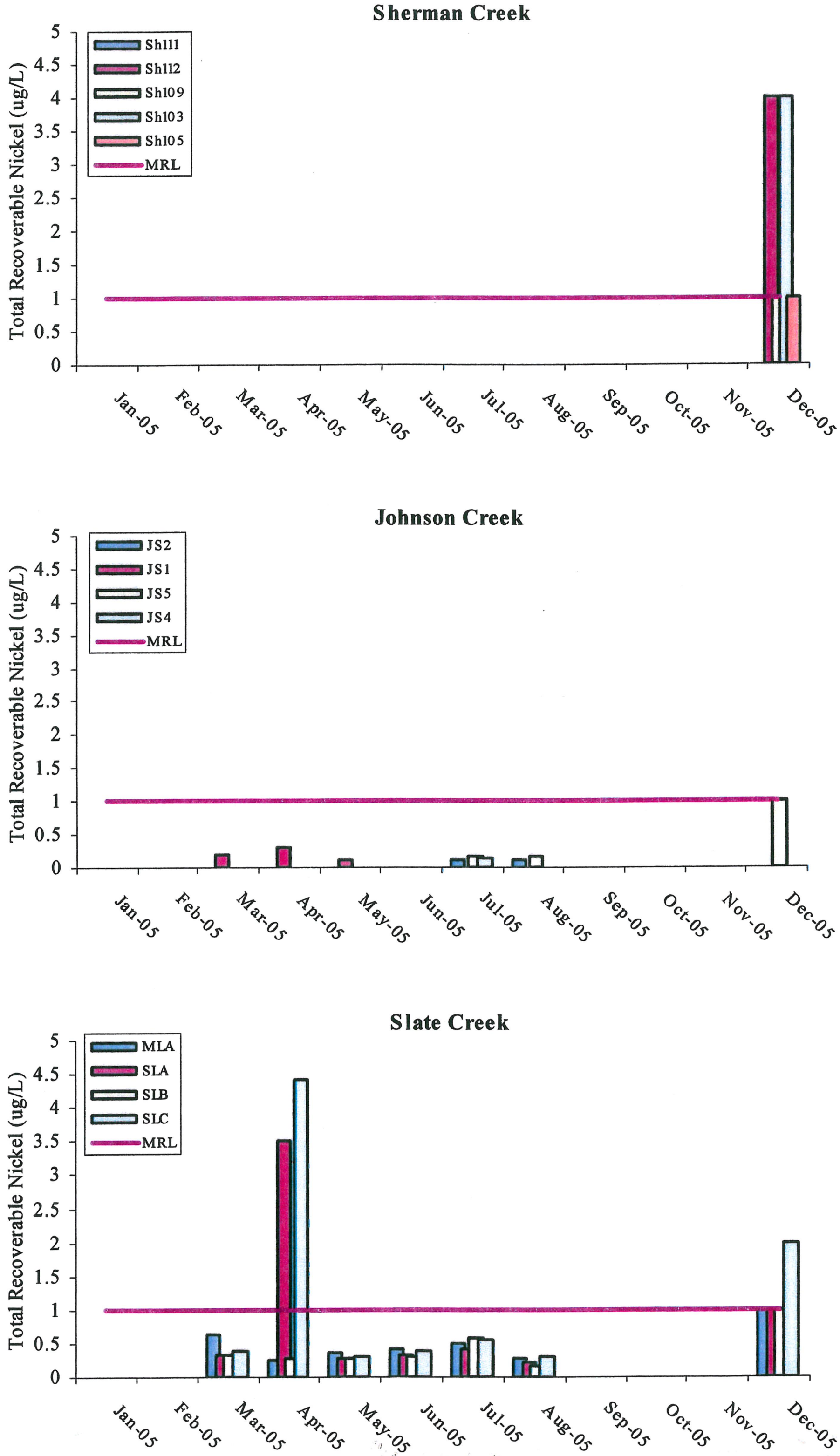


Figure 60. Total Recoverable Selenium concentrations in Receiving Water, 2005

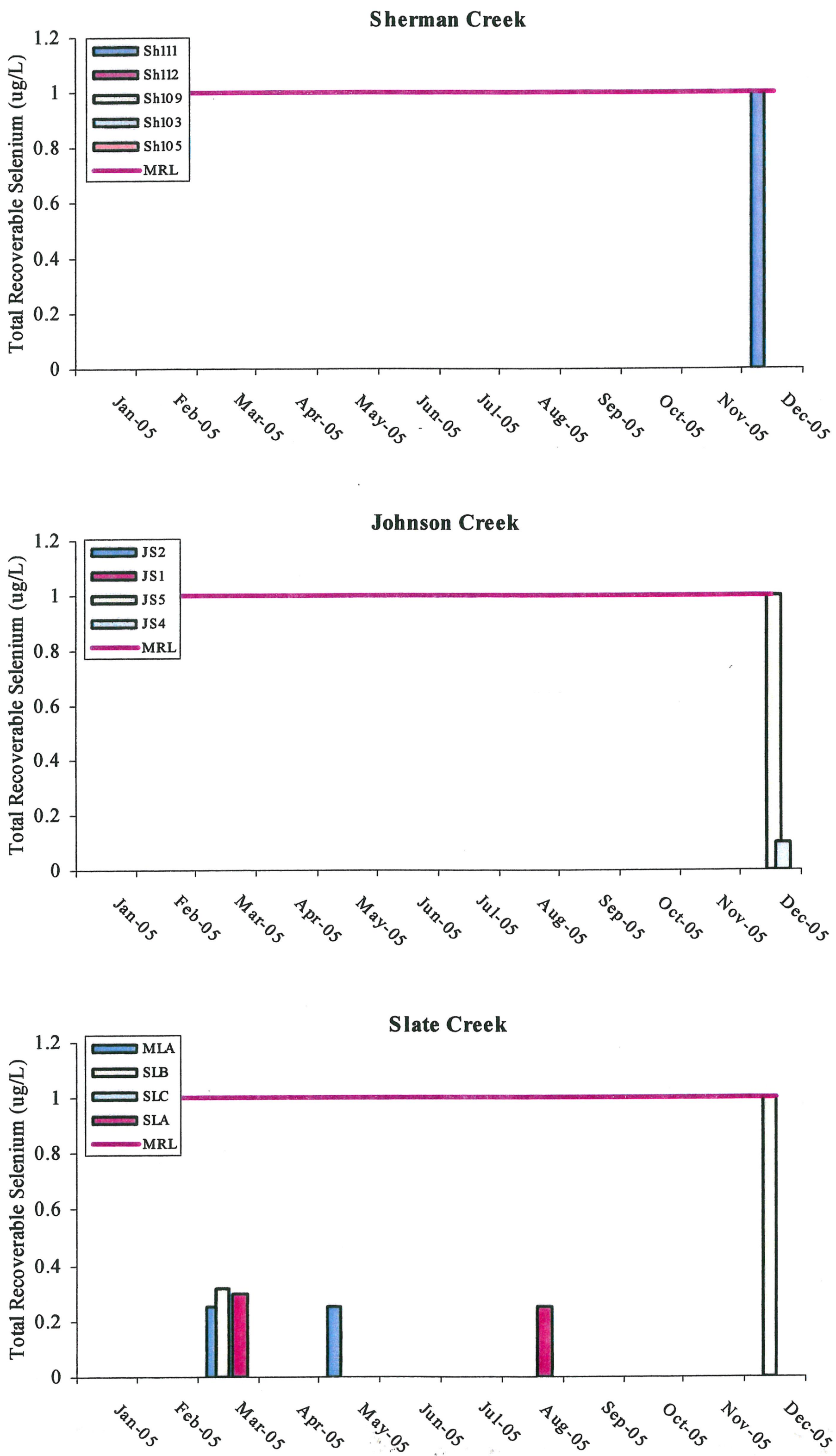
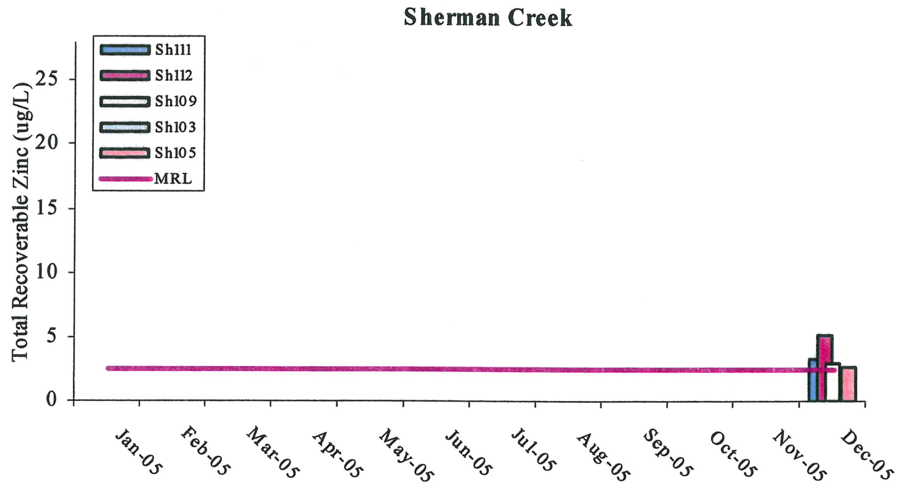
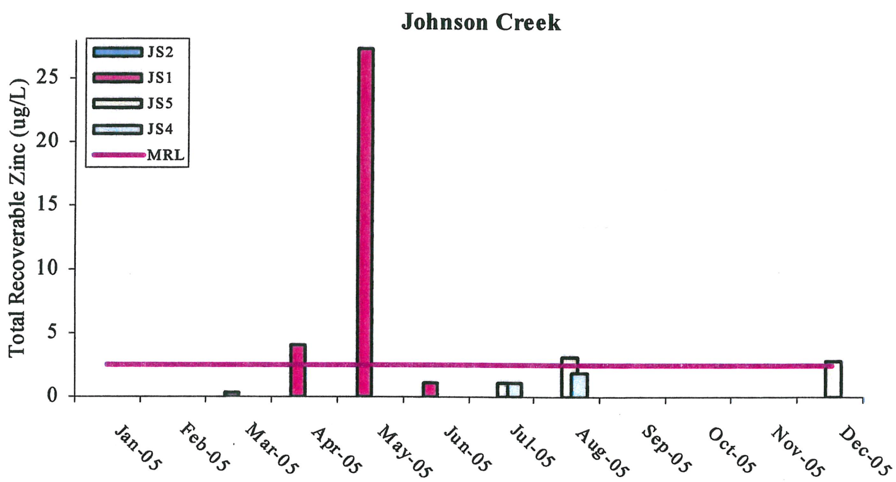
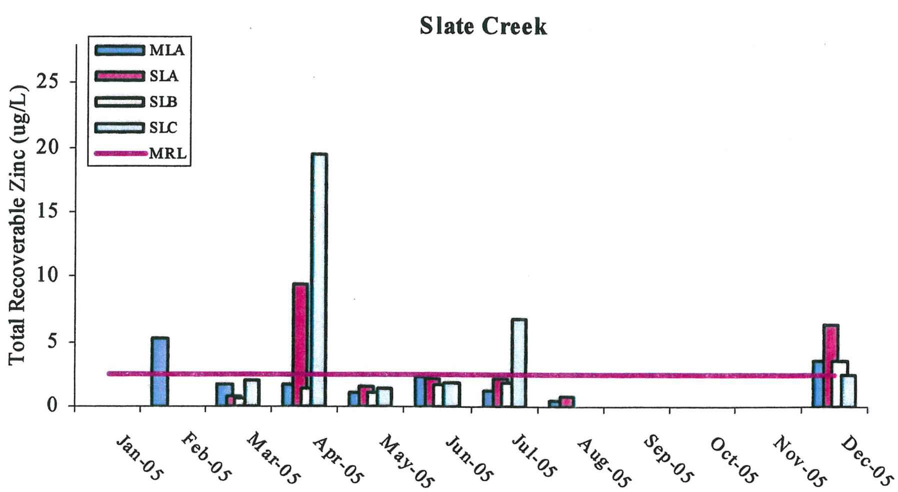


Figure 61. Total Recoverable Zinc concentrations in Receiving Water, 2005







5.5 Outfall-003 Effluent

Outfall 003 did not begin discharge until September 2005. Figures 62 through 66 show the analytical results for the effluent for Outfall 003, the domestic wastewater discharge. Table 5 and 6 contain monitoring data and Table 4 shows the effluent limitations as specified in Permit Part 1.C.1.

Figures 62 and 63 are graphs displaying monthly summary data containing monthly averages and daily maximums for BOD, Fecal Coliform, TSS and pH concentrations as reported in the Discharge Monitoring Reports from September to December. The maximum daily limit and the monthly average limit are shown on each graph. The graphs of Biological Oxygen Demand and Total Suspended Solids display discharge limits on a secondary axis in order to visually display both the limits and concentrations on the same chart. BOD levels were highest in September and November with the monthly averages peaking in September at 7.1 mg/L and the maximum daily concentration peaking in November at 22.1 mg/L, both still much lower than the permitted limits. Fecal Coliform concentrations were lowest in October and highest in December. The effluent exceeded the maximum daily limit on December 14th (see Table 6). Effluent pH remained within the minimum and maximum limits during the monitoring period. The daily maximum concentration occurred in December. TSS monthly average concentrations were highest in Sept and November along with daily maximum concentrations.

The analytical results of data collected during daily and weekly monitoring are listed in Table 6 and graphically presented in Figures 64 and 65. Figure 64 shows that Fecal Coli form concentrations were typically less than 40,000 (#/100ml). BOD concentrations varied from 2.1 mg/L to 19.3 mg/L, remaining below the daily limit of 60 mg/L during all monitoring and non-detect during two weeks of October, which is not visible on the graph. pH remained within daily maximum limits for the entire monitoring period with values ranging from 7.39 to 8.14 pH units. Figure 3 shows discharge flow levels recorded daily. 003 Effluent discharge remained between 5 and 15 gpm with a few peaks above in September, October and December.

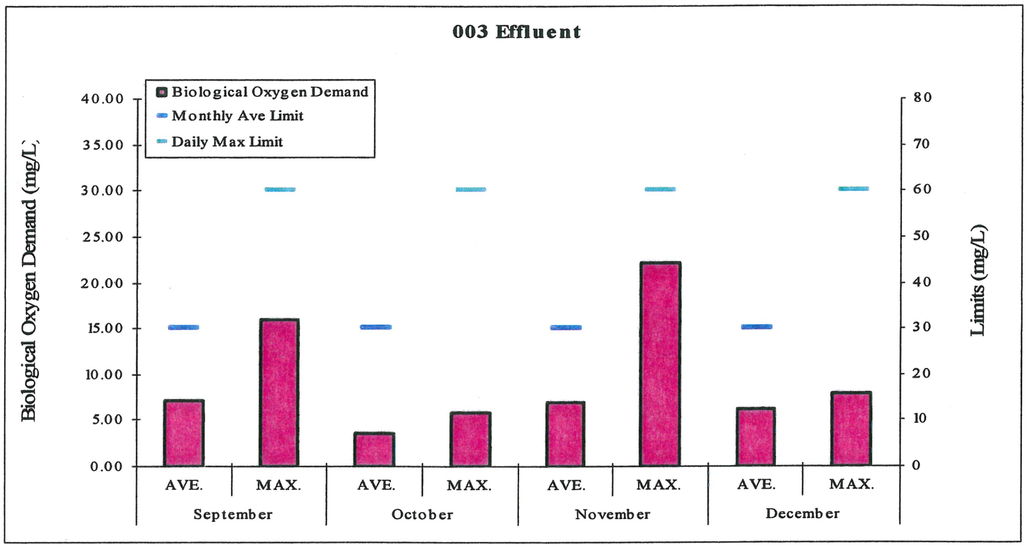
Table 4: Table of Effluent Limitations – Outfall 003, 2005

003 Effluent Limitations			
Parameter	**Units**	**Max Daily**	**Average Monthly**
Flow	gpd	60,000	30000
Biochemical Oxygen Demand	mg/L	60	30
Total Suspended Solids	mg/L	60	30
Fecal Coliform	#/100ml	150,000	100,000
pH	pH units	range 6.5 < pH <8.5	

Table 5: Effluent Monitoring Data Table – Outfall 003, 2005

003 Effluent Outfall									
		September		**October**		**November**		**December**	
Parameter	Units	Ave.	Max.	Ave.	Max.	Ave.	Max.	Ave.	Max.
Biological Oxygen Demand	mg/L	7.1	15.9	3.53	5.82	6.94	22.10	6.29	7.83
Total Suspended Solids	mg/L	8	23	1.15	4.60	8.15	25.50	6.03	11.00
Fecal Coliform	#/100mL	2105	3700	183	262	8628	31000	46689	181000
003 pH	pH units	7.55	7.67	7.95	8.14	7.89	8.01	7.99	8.36

Figure 62: Effluent Monitoring Results – Outfall 003, 2005



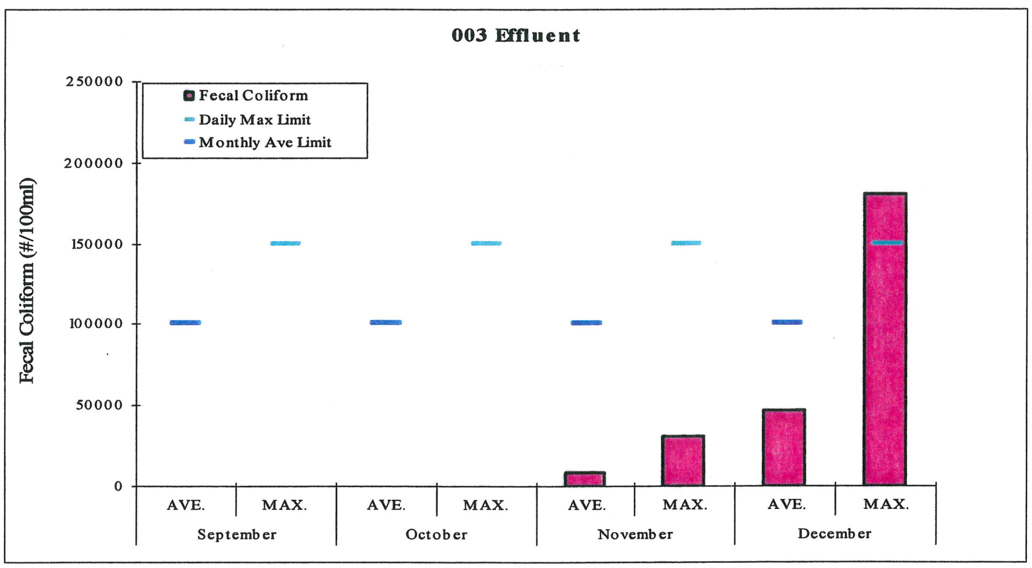
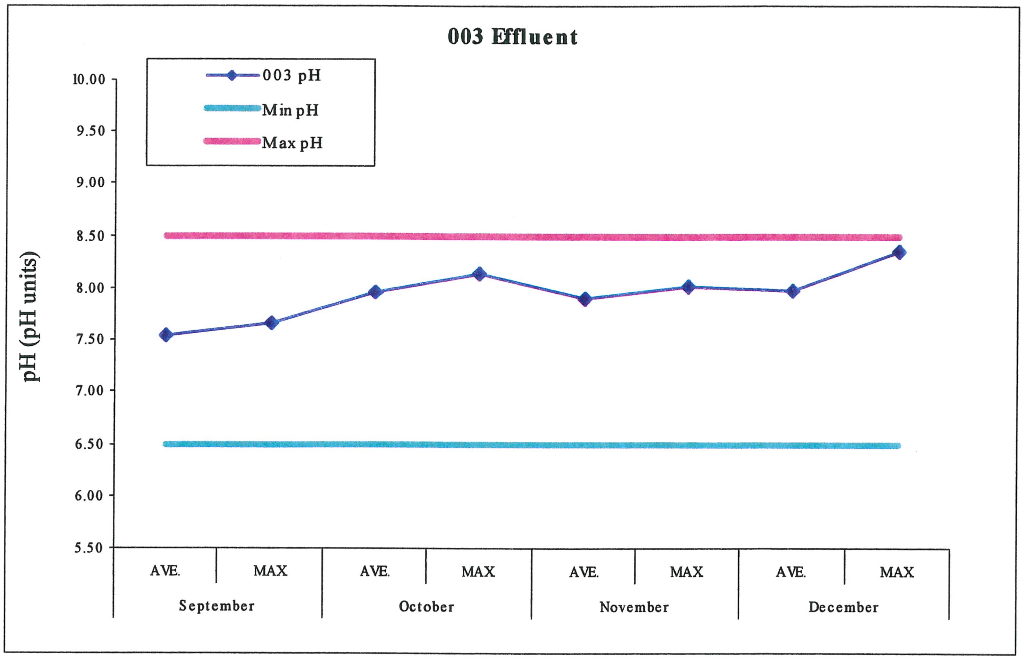
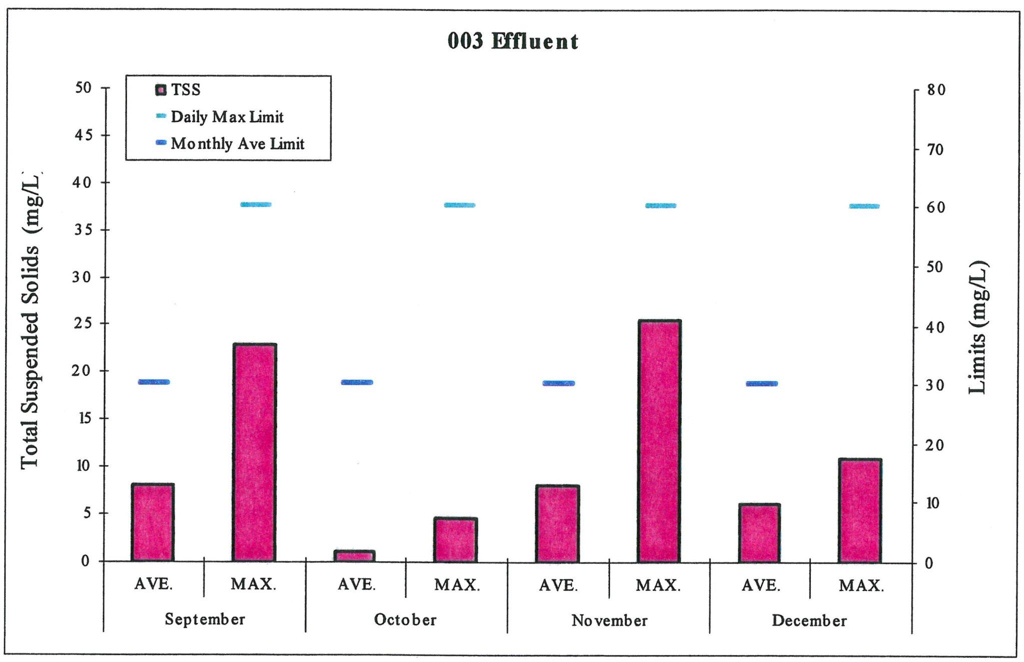


Figure 63: Effluent Monitoring Results – Outfall 003, 2005 (cont'd)



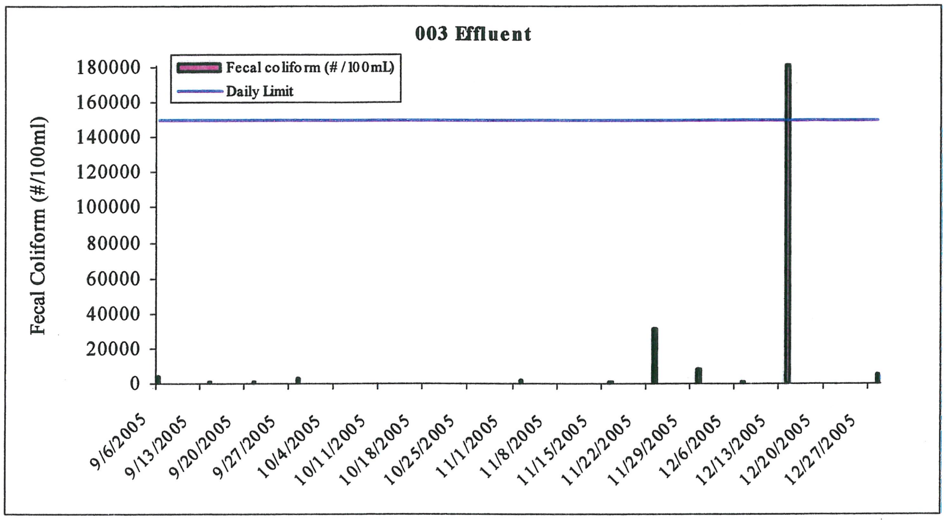


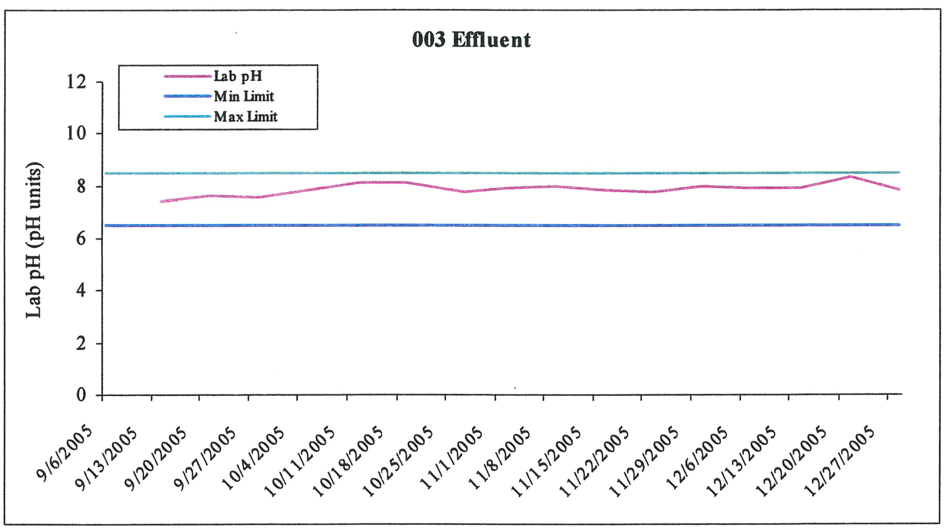
Note: Total Suspended Solids and pH was not collected prior to Permit No. AK-005057-1

Table 6: Effluent Monitoring Results – Outfall 003, 2005

Effluent Outfall- 003					Effluent Outfall- 003				
Collect Date	Discharge Flow (GPM)	Lab pH	Fecal coliform (#/100mL)	Biological Oxygen Demand (mg/L)	Collect Date	Discharge Flow (GPM)	Lab pH	Fecal coliform (#/100mL)	Biological Oxygen Demand (mg/L)
9/1/2005	8.541				11/1/2005	7.430			
9/2/2005	6.250				11/2/2005	5.555	7.94	2300.00	3.82
9/3/2005	7.708				11/3/2005	9.860			
9/4/2005	9.583				11/4/2005	6.527			
9/5/2005	8.263				11/5/2005	8.958			
9/6/2005	7.986	ND	3700	15.9	11/6/2005	7.361			
9/7/2005	8.333				11/7/2005	6.736			
9/8/2005	8.263				11/8/2005	7.083			
9/9/2005	9.236				11/9/2005	7.291	8.00	210.00	2.41
9/10/2005	8.333				11/10/2005	7.986			
9/11/2005	17.22				11/11/2005	8.333			
9/12/2005	22.01				11/12/2005	9.027			
9/13/2005	8.819				11/13/2005	7.777			
9/14/2005	10.76	7.39	770	4.9	11/14/2005	8.819			
9/15/2005	8.888				11/15/2005	8.472			
9/16/2005	9.513				11/16/2005	7.986	7.87	1000.00	2.22
9/17/2005	7.986				11/17/2005	10.55			
9/18/2005	8.055				11/18/2005	7.708			
9/19/2005	24.93				11/19/2005	8.888			
9/20/2005	4.097				11/20/2005	8.055			
9/21/2005	5.764	7.61	1050	2.1	11/21/2005	10.28			
9/22/2005	14.65				11/22/2005	6.805			
9/23/2005	6.180				11/23/2005	8.680	7.76	31000.00	19.30
9/24/2005	7.222				11/24/2005	7.013			
9/25/2005	5.764				11/25/2005	5.764			
9/26/2005	8.541				11/26/2005	6.805			
9/27/2005	7.083				11/27/2005	7.222			
9/28/2005	6.388	7.58	2900	5.3	11/28/2005	6.805			
9/29/2005	8.402				11/29/2005	9.513			
9/30/2005	6.875				11/30/2005	10.14	8.01	8100.00	22.10
10/1/2005	7.916				12/1/2005	8.819			
10/2/2005	7.986				12/2/2005	8.263			
10/3/2005	5.555				12/3/2005	8.402			
10/4/2005	9.097				12/4/2005	8.749			
10/5/2005	14.305	7.82	160	4.76	12/5/2005	8.888			
10/6/2005	8.333				12/7/2005	8.680	7.89	727	4.78
10/7/2005	6.805				12/8/2005	9.027			
10/8/2005	6.736				12/9/2005	7.500			
10/9/2005	7.291				12/10/2005	9.097			
10/10/2005	8.472				12/11/2005	14.03			
10/11/2005	5.416				12/12/2005	9.930			
10/12/2005	7.847	8.14	81.8	<2	12/13/2005	8.055			
10/13/2005	9.027				12/14/2005	19.72	7.89	181000	7.80
10/14/2005	6.944				12/15/2005	16.74			
10/15/2005	7.638				12/16/2005	16.39			
10/16/2005	11.041				12/17/2005	7.986			
10/17/2005	3.611				12/18/2005	8.541			
10/18/2005	7.500				12/19/2005	10.55			
10/19/2005	9.583	8.10	262	<2	12/20/2005	9.652			
10/20/2005	8.680				12/21/2005	5.486	8.36	130.00	4.74
10/21/2005	23.193				12/22/2005	5.416			
10/22/2005	7.986				12/23/2005	6.666			
10/23/2005	5.764				12/24/2005	7.291			
10/24/2005	7.222				12/25/2005	7.986			
10/25/2005	8.194				12/26/2005	7.083			
10/26/2005	9.236				12/27/2005	5.902			
10/27/2005	7.708	7.74	230	5.82	12/28/2005	7.083	7.81	4900	7.83
10/28/2005	10.208				12/29/2005	8.402			
10/29/2005	8.749				12/30/2005	5.277			
10/30/2005	10.555				12/31/2005	5.000			
10/31/2005	7.847								

Figure 64: Effluent Monitoring Results – Outfall 003, 2005 (cont'd)





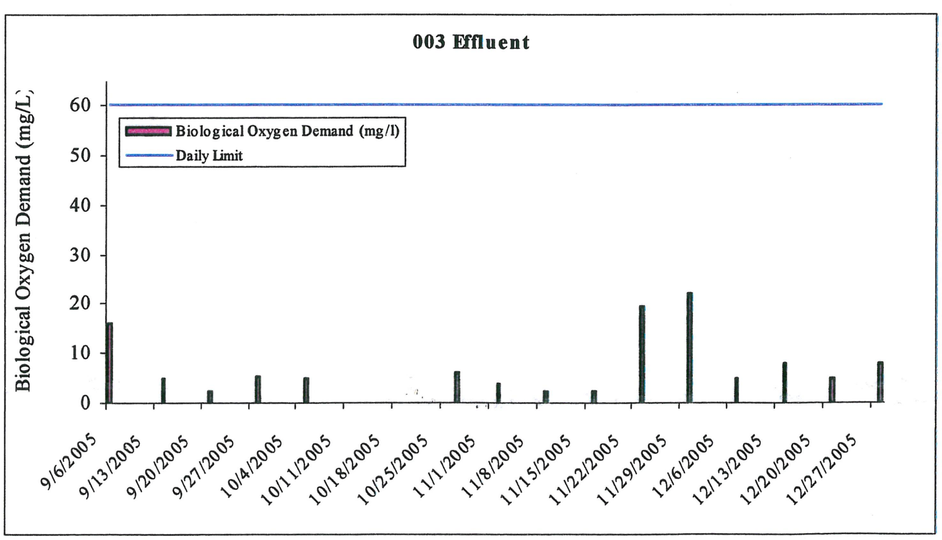
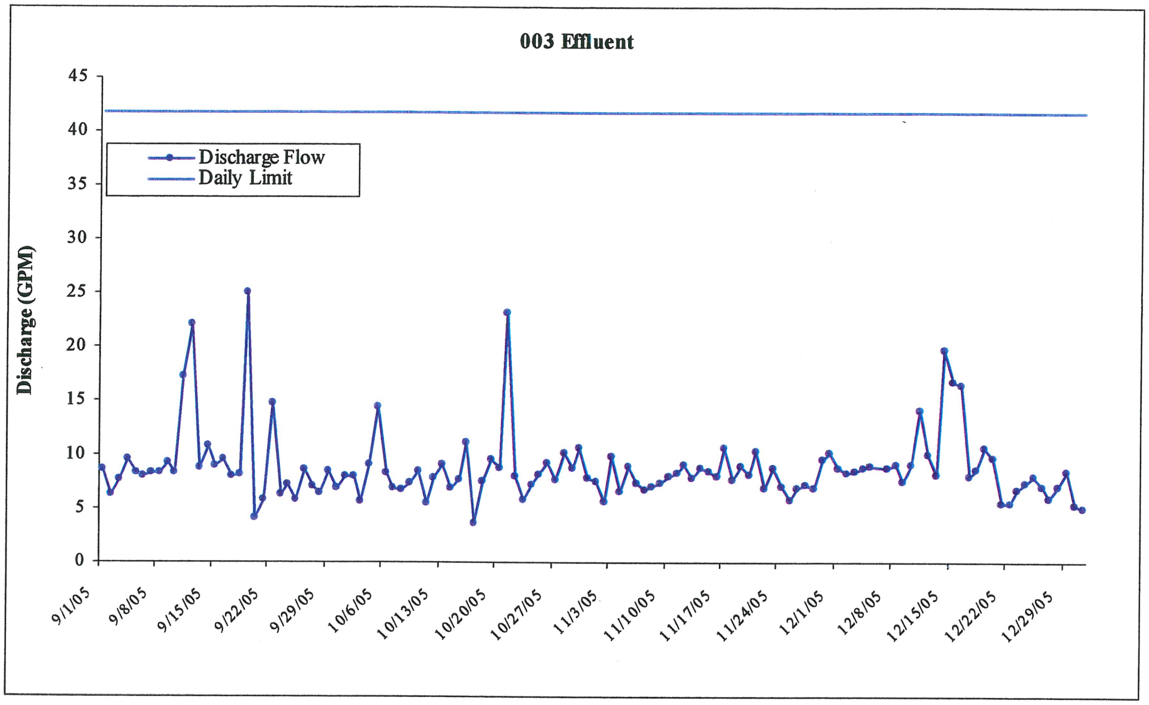


Figure 65: Effluent Monitoring Results – Outfall 003, 2005



List of Appendices